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A TREATISE

OF

Chirurgical Operations,

According to the

MECHANISM of the PARTS

OF THE

HUMANE BODY,

AND THE

THEORY *and* PRACTICE

Of the most Learned and Experienced

SURGEONS in *PARIS.*

WITH THE

BANDAGES for each APPARATUS,

AND A

Description of the INSTRUMENTS

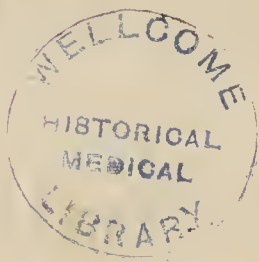
Proper for

CHIRURGICAL OPERATIONS.

Translated from the *FRENCH* of*Mons. Renatus James Croissant Garengéot.**Revis'd and Corrected by Mr. St. ANDRE.*

L O N D O N:

Printed for THO. WOODWARD, at the *Half-Moon*
against St. Dunstan's Church in *Fleetstreet.* 1723.





PREFACE.



THOUGH many French Surgeons, both antient and modern, have writ learnedly about Chirurgical Operations, and the late Treatises of Messieurs Verduc, la Charriere, Lavauguion, and Dionis, have met with a great Reception; yet I have not scrupled to publish this Work for the following Reasons.

THE Art of Surgery. which is allowed to be the most evident, the safest, and most useful Part of practical Physick, is daily improved, both in its Theory and Practice, especially at Paris, where many able Surgeons strive to make themselves eminent in their Art, and to carry it to the highest Degree of Perfection.

P R E F A C E.

ANATOMY, (the Foundation of Chirurgical Practice,) is there cultivated with great Application; and the surprizing Cures daily perform'd in that City, have convinced all Europe that there is not any Place where Surgery is practised with better Success.

AFTER I had exercised that Art for some Years under my late Father, Royal Surgeon of Vitre, a Man of Reputation; and then in some Towns and Hospitals of Bretagne, and in two Campaigns by Sea; the Desire of sharing in the Glory of those celebrated Surgeons, and improving my self by their Instruction, moved me to go to Paris, where for the Space of many Years, I have spared no Pains to get a full Knowledge of whatever is useful and curious in Anatomy. I followed those great Masters with such an Eagerness, that being sensible how much I was desirous to receive their Advices, and mind all their Steps, either in Hospitals, or any where else, they were so kind as to remove my Doubts, clear my Difficulties, and discover to me those Motives which frequently induce them to depart from the common Method in the Cure of Diseases.

THEIR

P R E F A C E.

*T*H*EIR* different *W*ays of operating have always been the principal Subject of my Observations; and the Reflections I made upon their different Methods, enabled me to publish in this Work such Explications concerning Chirurgical Diseases, and such Remarks upon the Manner of each Operation, as are not to be found in any other Book. And because I am indebted to those excellent Practitioners for every thing that is new in this Treatise, they have been pleased to give me leave to name them, whenever there is Occasion for it.

*I**E* I have not enlarged upon the general Precepts, which concern Operations, 'tis not because I believe they are useless, but because they have been fully treated of in Chirurgical Introductions; and therefore I supposed that those, for whom I write, are sufficiently acquainted with them.

I *H*A*V*E, in the first Place, explain'd the Nature and Causes of each Disease, its Differences, its Symptoms, which I have accounted for mechanically, its diagnostic and prognostic Signs; and before I discourse of the Operation, I shew by what means it may be sometimes prevented. Afterwards, I proceed to the Operation; nay, I describe

P R E F A C E.

the different Methods of operating; and I conclude with the Application of the Apparatus and Bandages proper for each Operation. Lastly, I have inserted at the End of this Work a short Description of those Instruments that are most necessary for Chirurgical Operations. Wherein I have followed the Order observed by the celebrated Mr. Arnaud, I mean the different Classes into which he divided the same Instruments, when he described them in the Royal Garden of Plants. As for the Divisions of each Instrument, and the Denominations of its several Parts, they are the Result of my own Reflections, and of the Enquiries I made about them among the most curious Artists.

I HAVE endeavoured to be concise. I have also used a plain Stile, being persuaded that a plain Narration is more proper for a Treatise of Surgery, than a florid Stile.

To conclude, I don't pretend to publish an accomplish'd Work: Self-love does not conceal its Imperfections from me. My only Design is to enable young Students to reflect upon what they have learn'd from

P R E F A C E.

from the famous Surgeons of Paris, and to instruct others, who have not had the Happiness to see the Operations of those eminent Masters, nor to clear their Doubts by conversing with them.



*Approbation of the Faculty of Physick
at Paris.*



It was a pleasant Saying of an Antient, That a great Book is a great Sin. If it be so, how many Sins have been committed in Physick and Surgery! One ought to think otherwise of the *Treatise of Chirurgical Operations* by Mr. Croissant Garengot. The Operations are very orderly treated of in that Work. Each of them is attended with Observations necessary for the Cure. The Author explains the Symptoms of Chirurgical Diseases. He describes the old Instruments, and mentions many others newly invented. He gives an Account of those Methods of operating, that are peculiar to experienced Masters; and we have seen most of their Approbations. We are not afraid the Author should be accounted a Pilferer; and if he was a Plagiary, it were to be wished we had many Writers like him. This is the Judgment we give of this Book, after a careful Examination of it. Done at *Paris*, Octob. 19. 1719.

MICHAEL PEAGET.
LEWIS DE SANTEUL.

Having heard the Report of Messieurs *Peaget* and *Santeul*, Doctors of the Faculty, and appointed

pointed to examine a Book intituled, *a Treatise of Chirurgical Operations by Mr. Croissant Garengéot*, the Faculty give their Consent to the Impression of it. *Paris, Octob. 19. 1719.*

D E U T E Dean.

Approbation of Dr. Winslow, Regent of the Faculty of Physick at Paris, and Fellow of the Royal Academy of Sciences.

THIS Collection is the Fruit of a constant Attendance upon the publick Lectures, and private Exercises of Surgery. The Author gave me great Proofs of that Attendance, on many Occasions. He shew'd an earnest Desire of making himself an able Surgeon, no small Industry to improve by the daily Observations, and a great Willingness of being useful to the Publick. Wherefore this Work is highly valuable for the Matter contain'd in it, which is taken from the Practice of the most excellent Surgeons of *Paris*; and the Author deserves to be commended for doing them Justice, and adding his own Remarks with some ingenious Reflections. Done at *Paris, Novemb. 7. 1719.*

W I N S L O W.

Approbation of Dr. Silva, Regent of the Faculty of Physick in the University of Paris, and Physician to his most serene Highness Monseigneur the Duke.

THE Book of Mr. Garengéot ought the more to be commended, because there are few Writers in Surgery, whom he could make use of and because he is so modest and sincere as to ascribe

scribe to himself nothing that belongs to others. I am persuaded that those, whom he frequently quotes, are sensible their Reflections have not lost their Worth in the Hands of that Author. The Publick will doubtless be very much obliged to him for the Benefit arising from his Work; and the Learned will read his Book with Satisfaction. *Paris, Octob. 25. 1719.*

SILVA.

Approbation of Dr. Col de Vilars Regent of the Faculty of Physick at Paris, Professor of Pharmacy, and Physician to the King in ordinary, sworn in the Chatelet of Paris.

I HAVE read and examined with great Care and Pleasure a *Treatise of Chirurgical Operations* by Mr. Croissant Garengot, Surgeon. His Way of describing those Operations shews that he goes upon an exact Knowledge of Anatomy, which alone can afford good Rules to perform them well. The essential Circumstances mention'd by him, and omitted by other Authors; the new Method of operating, on many Occasions, more speedy, safer, and more agreeable than that which was formerly used; and the great Number of Observations collected out of the most excellent Masters, ought to make this Work very acceptable to the Surgeons, and very useful to the Publick. *Paris, May 16. 1719.*

COL de VILLARS.

Ap-

*Approbation of Dr. Alliot de Mussey, Regent of
the Faculty of Physick at Paris, and Professor
of Pharmacy.*

HITHERTO the great Number of Books, which come out every Day in Physick and Surgery, have been justly complained of. But, if they had been full of exact Observations ; if all the Arguments and Systems, contain'd in them, had been only grounded upon a perfect Knowledge of Anatomy, and upon Experience, 'tis certain they would have afforded a very great Benefit. The new Book of *Chirurgical Operations* by Mr. Croissant Garengot, Surgeon, contains all those Qualifications hitherto so much wanted. The Arguments are exact : the Systems are grounded upon Mechanicks, and the Structure of the humane Body : the Observations are those of the best Practitioners in our Time : the Description of the Instruments, which has been so imperfect and intricate to this Day, is very full and neat in this Treatise. Nay, the Author describes many new Instruments, and others that have been perfected. Which makes me believe this Work will be very useful to the Surgeons, and approved by all the Learned. *Paris, May 20.*
1719.

ALLIOT DE MUSSEY.

*Approbation of Mr. Devaux, heretofore Master of
the Company of the Surgeons of Paris.*

I HAVE read with Pleasure a *Treatise of
Chirurgical Operations*, written by Mr. Crois-
sant Garengot, Surgeon, of the Province of
Bre-

of *Bretagne*. Those Diseases which require the Hand of a Surgeon, are explain'd by that Author in such a manner as shews him to be well skill'd in Anatomy. The Operations are described with great Exactness in that Treatise. It contains also many useful Remarks upon the different Methods of operating, made use of by our best Practitioners, and besides, a short Account of several extraordinary Cures happily perform'd by the ingenious Inventions of those excellent Masters. Lastly, the Explication of the Chirurgical Instruments, to be found at the End of this Work, being as perfect as can be, makes me believe it will be of great Use to young Surgeons in the most difficult Cases, since nothing more exact and instructive hath been hitherto published upon practical Surgery. Such is my Judgment about this Treatise, after having read it with the Attention it deserves. *Paris, May 1. 1719.*

DEVAUX.

Approbation of Mr. Poncelot, heretofore Master of the Company of the Surgeons of Paris, and Demonstrator of Anatomy and Surgery.

I HAVE carefully read the Operations of Surgery, which the Author offers to the Publick. His constant Attendance upon the best Masters in that Art, of which I have been a Witness for many Years, whilst I had the Honour to profess Surgery at St. Come's, in the Schools of Physick, and in the King's Garden, is a sufficient Inducement for me to assure young Surgeons that this Work will be useful to them. *Paris, Novemb. 3. 1719.*

PONCELET.

Ap-

Approbation of Mr. Costz, sworn Surgeon of Paris, heretofore Master of his Company, and Demonstrator of Anatomy.

NOTHING can be more instructive upon Chirurgical Operations, than the Treatise which Mr. *Croissant Garengéot*, Surgeon of the Province of *Bretagne*, has lately given us on that Subject. Every thing in it is agreeable to the Precepts of a good Practice, and supported by just and solid Arguments. He describes the Operations with great Exactness, and likewise those Instruments, that are most proper for them. I heartily wish Surgeons would read it with Application. Every thing in that Book is grounded upon a perfect Knowledge of Anatomy, and the Experience of the greatest Masters. Such is the Judgment I give of that Treatise, after a careful reading of it. *Paris, May 15. 1719.*

C O S T Z.

Approbation of Mr. Petit, heretofore Master of his Company, Demonstrator of Anatomy and Surgery, and Fellow of the Royal Academy of Sciences.

AF T E R the reading of a Manuscript intituled, *a Treatise of Chirurgical Operations, &c.* by Mr. *Croissant Garengéot*, I thought it was not so proper for me to approve the whole Work, (considering that the Author has inserted in it several of my Observations, and a Description of some Instruments of my own Invention,) as to give my Consent to the Impression of it. I am willing to favour the Author's Design of being useful to the
Pub-

Publick. He will doubtless succeed in that Design, if those things which he has borrowed from me, do not depreciate the excellent Materials with which they are to be found. *Paris, May 13. 1719.*

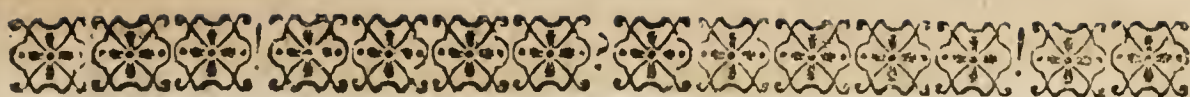
P E T I T.

*Approbation of M. L. Roux, sworn Surgeon
of Paris.*

I HAVE read very carefully, and with great Pleasure, a Manuscript of Mr. *Croissant Garengeot*, Surgeon, containing a *Treatise of Chirurgical Operations, and a short and exact Description of those Instruments that are made use of to perform them.* I find by the Theory of this Treatise, that the Author is a perfect Master of his Subject, and it appears by the great Number of Observations, and extraordinary Cures mention'd by him, that he is very well acquainted with every thing that concerns the Art of curing Diseases. We may therefore entertain great Hopes of that Surgeon, and believe he will hereafter very much contribute to the Perfection of Surgery, since he has got the Esteem of the Learned by his first Essay. *Paris, June 1. 1719.*

L. R O U X.

T H E



T H E

TABLE of CHAPTERS.

Chap. 1.	<i>OF Operations in general, their Definition and Division,</i>	Page 1
Chap. 2.	<i>Of Wounds in relation to Sutures,</i>	3
Chap. 3.	<i>Of Sutures, with some Precepts for the dressing a Wound,</i>	19
Chap. 4.	<i>Of the Gastroraphy,</i>	48
	<i>Of the Bandage, known by the Name of N A P K I N and</i>	
	<i>SCAPULARY,</i>	81
Chap. 5.	<i>Of Hernias,</i>	84
Chap. 6.	<i>Of the Operation of the Bubonocoele, and the crural Hernia,</i>	112
Chap. 7.	<i>Of the Operation of the compleat Hernia,</i>	120
Chap. 8.	<i>Of the Operation of the EXOMPHALOS and ventral</i>	
	<i>HERNIAS,</i>	134
Chap. 9.	<i>Of the Dropsy, in relation to the PARACENTESIS,</i>	142
Chap. 10.	<i>Of the Operation of the PARACENTESIS, or Punction</i>	
	<i>of the Belly,</i>	151
Chap. 11.	<i>Of the Hydrocele,</i>	164
Chap. 12.	<i>Of the Operation of the Hydrocele,</i>	168
Chap. 13.	<i>Of the Castration, in relation to these Diseases which re-</i>	
	<i>quire that Operation.</i>	178
Chap. 14.	<i>Of the Operation of the Castration,</i>	182
Chap. 15.	<i>Of the Stone in the Bladder, in relation to Lithotomy,</i>	187
Chap. 16.	<i>Of the Method of sounding, in relation to the Diseases of the</i>	
	<i>Bladder,</i>	195
Chap. 17.	<i>How the Patients ought to be prepared for the Operation</i>	
	<i>of Lithotomy</i>	207
Chap. 18.	<i>Of the Operation of Lithotomy, or the Extraction of the</i>	
	<i>Stone</i>	210
Chap. 19.	<i>Of the Stone in the Urethra, and the Operations proper for</i>	
	<i>it,</i>	228
Chap. 20.	<i>Of the Phimosis,</i>	231
Chap. 21.	<i>Of the Operation of the Phimosis,</i>	234
Chap. 22.	<i>Of the Paraphimosis,</i>	239
Chap. 23.	<i>Of the Operation of the Paraphimosis,</i>	242
Chap. 24.	<i>Of the Fistula in Ano, and Abscesses, which happen in</i>	
	<i>that Part,</i>	247
Chap. 25.	<i>Of the Operation of those Abscesses, which happen in the</i>	
	<i>ANUS,</i>	251
Chap. 26.	<i>Of the Operation of the Fistula in Ano,</i>	256
Chap. 27.	<i>Of the Wounds and Abscesses of the Breast, in relation to</i>	
	<i>the Empyema,</i>	263
		Chap

The TABLE of CHAPTERS.

Chap. 28. Of the Operation of the Empyema,	271
Chap. 29. Of incised Tumors, known by the Names of Wens, Glands, Scirrhus, Cancers, and those called by the Antients Atheroma, Steatoma, and Meliceris,	278
Chap. 30. Of the Operation of the Cancer and incised Tumors,	289
Chap. 31. Of the Squincy, in relation to the Bronchotomy,	299
Chap. 32. Of the Operation of the Bronchotomy,	304
Chap. 33. Of the Hare-Lip,	310
Chap. 34. Of Cancers, and Pustules, which happen sometimes in the Lips,	321
Chap. 35. Of the Polypus,	324
Chap. 36. Of the Operation of the Polypus,	329
Chap. 37. Of the Fistula Lacrymalis,	333
Chap. 38. Of the Operation of the Fistula Lacrymalis, Of the Bandage, call'd the single Eye,	342 353
Chap. 39. Of Wounds of the Head and of Fractures of the Skull, in relation to the Trepan,	359
Chap. 40. Of the Operation of the Trepan, Of the great Courvrechef, or the square Courvrechef,	385 405
Chap. 41. Of the Aneurism,	409
Chap. 42. Of the Aneurism,	417
Chap. 43. Of the Wounds of Tendons, in relation to their Sutures, Of the Triangular Scarf,	433 439
Chap. 44. Of the Suture of the Tendons,	439
Chap. 45. Of the Panaris,	
Chap. 46. Of the Operation and Cure of all kinds of Panaris's, Of the Bandage with eighteen Heads,	457 465
Chap. 47. Of the Gangrene and Sphacelus, in relation to Amputation, Of the Cure of a Gangrene,	467 476
Chap. 48. Of the Amputation of the Leg, Of the Bandage call'd the Capeline with one Head,	482 496
Chap. 49. Of the Amputation of the Leg, as invented at the same Time by Mr. Sabourin, a Surgeon of Geneva, and Mr. Verdvin, a Dutch Surgeon,	498
Chap. 50. Of the Amputation of the Thigh, Of the Bandage proper for the Amputation of the Thigh,	503 506
Chap. 51. Of the Amputation of the Fingers, Of the Bandage proper for the Amputation of the Fingers,	507 509
Chap. 52. Of the Amputation of the Fore-arm, Of the Bandage proper for the Amputation of the Fore-arm,	511 514
Chap. 53. Of the Amputation of the Arm, Of the Bandage proper for the Amputation of the Arm,	516 518
Chap. 54. Of the Amputation of the Arm in the Joint, Of the descending Spica proper for the Amputation of the Arm in the Joint,	521 525



A

T R E A T I S E

O F T H E

Operations of Surgery.



C H A P. I.

Of Operations in general, their Disfinition, and Division.



THE Operation of Surgery is an industrious Motion of the Surgeon's Hand, upon the Parts of the humane Body, in order to restore or preserve Health.

MOST of those, who have writ concerning the Art of operating in Surgery; considering the Operations according to their Nature, or rather according to their *Genus*; have divided them

B

into

into four different Kinds, which they call *Syntesis*, because it re-unites those parts that are separated; *Diæresis*, because it divides those parts which are united contrary to the order of nature; *Exæresis*, because it removes what is extraneous to the Body; and *Prothesis* or *Hypothesis*, because it adds some external Instrument to the Body, in order to supply the Want or Defect of some of its parts. Not contented with those Divisions, they have further subdivided every Kind into many more, and left us such a confused Number of Sub-Divisions, that one does not know what Course to take.

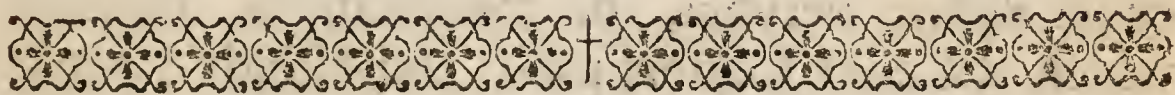
THE three first Kinds of those Divisions, having such a strict dependence on each other, that they generally go together, and are to be met with in most Operations; we shall lay aside those scholastical Terms, which rather perplex than instruct, and shall keep only to the Etymology of each Operation, which is derived from the part on which it is performed; or from its Resemblance to some other thing, as it will be said hereafter.

LASTLY, without further insisting upon those general Notions, we shall lay down these Rules; that all chirurgical Operations ought to be performed *speedily, safely, and dexterously*. But to make Use of those Precepts, a Surgeon ought to know that the Operations consist of two Parts; the one concerns the Theory, and the other concerns the Practice.

THE first takes in the Knowledge of the Disease, its Cause, Beginning, Progress, State, and End, and of some other Circumstances, which ought

ought to be known before one goes about the Operation, that one may judge of the Necessity of its Performance, and what Remedies are proper for the Disease: This is to be learned by the reading of good Books, and by an accurate Knowledge of Anatomy, without which 'tis impossible to be a good Surgeon.

THE Practice consists in the Method of preparing the *Apparatus*, in the Knowledge of Instruments, the manner of operating, and other Particulars to be learned only by frequenting good Surgeons, by reading the Observations of able Practitioners, and by a constant Attendance in Hospitals.



CHAP. II.

Of Wounds in Relation to Sutures.

BY a *Wound* we mean a Solution of continuity, or a Division of the soft Parts of the Body, recent and still bleeding, proceeding from an external Cause, such as cutting, bruising, tearing, and pricking, whereby the natural Disposition of Parts is altered.

BEFORE I mention the Re-union of Wounds, it will not be improper to say something of the Manner how it is effected.

THE Reflections that have been made upon Anatomy and Pathology, teach us that our Body is only a *Compages* of Vessels, and that all the Parts

are formed by the different Figure and Disposition of those Vessels. Hence it is easy to apprehend, that if the Parts appear to us different from each other, that Difference proceeds only from the various Disposition of the Vessels of which they are composed, and by a necessary Consequence, that their different Disposition occasions in each Part several Spaces and Pores of different Figures: from whence it ought to be inferred, that the nutritious Particles of the Blood, which are to be conveyed into those Vessels, must necessarily be disposed and moulded according to the Configuration of the Pores and Tubes of each Part.

BY those Vessels I only mean elastick Fibers, either fleshy, nervous, or membranous, through which different Liquors pass; and Health depends upon the *Equilibrium* between the Tubes and the Liquors contained in them. Wherefore a Disease consists only in the Disorder of those Vessels, or in the Alteration of their Fluids.

BY *Fluids* I only mean the Blood, which is composed of several Principles, and appears to the Eye under the Form of two Substances, the one red, and the other white. This latter Part of the Blood is the nutritious Juice: It serves to maintain and repair the Parts.

AFTER these Explications, I think it will not be difficult to apprehend, that Nutrition, with Respect to Wounds, is a continued and prolonged Generation of Fibers, either cut or lacerated, which can only be effected by that white, balsamick, and viscous Part of the Blood, which we call the nutritious Juice, and is different in every Part, because
the

the Tubes of the several Parts have different Configurations, as has been already said.

THIS Truth is confirmed and supported by the Instance of Vegetation, since by putting many Grafts of a different Nature upon one Stock, they bear different Fruits, though they only receive the same Sap: But by the different Configuration of the Fibers of different Grafts, it is differently prepared, and consequently produces different Fruits.

WHEREFORE if the Bone be divided, the Juice contained in the bony Fibers, reaching their Ends, grows hard, stretches out, and fills up the Space made by the Division. The same happens in all the other Parts, as we observe in those Wounds, wherein the Skin is wholly destroyed; for we see that the Scar begins at the Circumference of the Wound, at the same time that the Middle is much more tender, because the Fibers, stretching themselves continually by the *Molecule* of the nutritious Juice, grow lesser, and by that Means make the Middle of the Scar thinner. On the contrary, in those Wounds wherein the Skin is not wholly destroyed, as in a Burn, the Scar forms it self on all Sides.

FROM whence it ought to be inferred, that a Surgeon, in the Re-union of Wounds, must endeavour to rectify that Sap by using general Remedies, when it is altered, and to restore the divided Fibers to their former State, with the help of Topicks, by making them pliant, and securing them from the Impression of the Air, which may alter the good Constitution of the nutritious Juice in the Fibers that are cut or lacerated. And the best Proof that can be given to shew that nothing can

be more pernicious to a Wound than the Air, is, that though no Remedy be immediately applied upon Fractures, yet they will reunite if they are not exposed to the Air; because the natural Heat gives to the nutritious Juice of the Bone, the hard Temperature it ought to have to heal up the Fractures.

THOUGH what I have said hitherto concerning Wounds, does manifestly prove that the Reunion is a mere Operation of Nature; yet in some cases Art has a great Share in it; and if a good Surgeon did not endeavour to remove the Obstacles, which hinder the Conjunction of the divided Parts, Nature would frequently work in vain.

THOSE Obstacles are either foregoing or subsequent. The former are those, which precede the Wound, *viz.* as I have already said, the different Alterations of the nutritious Juice. The subsequent Obstacles are those that happen after the Wound, such as Convulsions, *Delirium's*, Contusion, loss of Substance, Hemorrhagies, extraneous Bodies, the great distance of the Lips of the Wound, and the situation of the Wound it self.

AS for Convulsions and *Delirium's*, the only means to cure them are Phlebotomy, Purging, and some other Remedies taken inwardly.

THE Contusion is an Obstacle, which hinders the Lips of a Wound from joining together, and cannot be removed but by suppuration.

A Contusion happens several ways, whether the Wound be made by a bruising or cutting Instrument. The first tears and bruises the Parts, unless the Blow be slanting, as it happens sometimes in
Wounds

Wounds of the Head ; and then, as I shall say hereafter, a Suture ought to be made. But it would be a very great Fault to make Sutures in the first Instance, since that Obstacle, *viz.* the bruising of the Flesh, can only be removed by applying such Remedies as will excite a gentle Suppuration. If the bruised Wound happens to be in those Parts, that are commonly uncovered, such as the Face and the Arms, it must be stitched, without tying the Threads of the Suture, till the Suppuration is well over, at which time the Threads are tied in order to bring the Lips together.

THOUGH the Wound be made by a sharp Instrument, it frequently happens that the Edge of such Tools being somewhat rough, by cutting the Parts, bruises them also, and causes a Contusion in the Lips of the Wound, which is generally attended with an Inflammation, and consequently with a Suppuration. Bleeding affords every Day Instances of this Fact ; for when a Vein is opened with a bad Lancet, the Orifice is not closed up immediately, but it forms a little Tumor attended with an Inflammation, which one must not pretend to cure speedily by the use of Desiccatives, but rather by exciting a gentle Suppuration, which closes up the Orifice in two or three Days.

THE Loss of Substance is one of the chief things that prevent the re-union of Wounds, by reason of the difficulty of bringing the Lips together ; for before the Wound be reunited, it is necessary to repair the Parts. However, this Rule is liable to some Exceptions, as when the Wound happens in those Parts, which are very yeilding ; such as the Lips

and the Breast, which will afford us some Instances of it hereafter.

THE Hemorrhage is such a accident, that it deprives the operator of all the means, which Surgery affords to reunite wounds, unless it be first removed. This requires a great deal of attention; for when the opened Artery is surrounded with bony parts, it frequently falls out that no remedy can be applied, as in the extirpation of the *Polypus*; and the Patient dies by the effusion of blood. This truth is also confirmed by the drawing of teeth, out of which a great deal of blood does sometimes issue; but it may be stopped by compression.

THERE are two sorts of Hemorrhages, the one ordinary, and the other extraordinary. The first is nothing else but what happens in all Wounds; because there are no capillary Vessels but what will occasion a small Effusion of blood in the least Wounds. But by the latter we mean, a continual Effusion of Blood from some large Vessels; and there are two Hemorrhages of this Kind, the one proceeding from the Arteries, and the other from the Veins.

WE have three ways of stopping the Blood of an Artery, *viz.* the Compression, the Application of Stipticks, and the Ligature.

BUT if there was an extraneous Body in the Wound, and a considerable Hemorrhage of an Artery, must the Blood be stopped before the extraneous Body be removed? The answer is, that in this case the Ligature is the only thing that can be practised: And suppose a Surgeon was so fortunate as to make it well, the extraneous Body being drawn out would tear the Vessel, and occasion a new Hemorrhage:

rhage: And therefore Mr. *Petit*, sworn Surgeon of *Paris*, heretofore Master of his Company, Demonstrator of Anatomy and Surgery, and Member of the *Royal Academy of Sciences*, advises to take out the extraneous Body before the stopping of the Blood. And if the Hemorrhage is very considerable, the running of the Blood ought to be governed by the *Tourniquet*, and then the extraneous Body must be drawn out, and the Blood stopped.

THE Blood running from the Veins stops of it self, when after a large Effusion, the Part is discharged, or else, one ought to use the Compression, &c.

EXTRANEIOUS Bodies proceed from within or from without, and frequently from both at the same time. The former are either a Ball, the Ram, or several other things. The latter are parts of the Body it self, being three in number, *viz.* bruised Flesh, Fragments of Bones, and coagulated Blood. I shall hereafter give a particular Account of all those Matters.

THE Distance of the Lips of a Wound, and the Mobility of the Part, are further Obstacles to the Reunion. The Wounds of the Intestines afford us an Instance of it; for having no fixed Point, and consequently it being impossible to keep the Lips of the Wound together, the nutritious Juice will fall either into the Cavity of the Intestin, or into that of the *Abdomen*.

THE last thing that prevents the Reunion of Wounds, is their Situation; for if it happens in the Aponurosis of the Muscles, the Suture would occasion sad Accidents, whereby the Surgeon
would

would be obliged to cut it. If the Muscle be cut near its Aponeurosis, no Suture ought to be made in it, as, for Instance, in the temporal Muscle, because its Fibers being very short, and, as it were, sunk into a double Membrane, which is the *Pericranium*, and the Expansions of the frontal and occipital Muscles, they cannot stretch themselves : But a Chin-Cloth ought to be put on ; the Patient must not be allowed to speak, and must live upon liquid Aliments, which he takes with a perforated Spoon, the End of which is made flat ; and with the help of Compresses the Lips of the Wound are brought as near as possible.

HAVING mentioned those Means which Nature makes use of to re-unite the divided Parts, and to repair the Parts, when there is a Loss of Substance ; I shall in the next Place mention the several ways used by the Art of Surgery to effect that Re-union, *viz.* the Situation of the wounded part, the Bandages, and the Sutures.

THERE are in Surgery three Sorts of Situations ; one to know the Disease, another to operate ; and lastly, that which the part ought to be in after the Operation. All those Situations concern the Body or the Extremities. As to the Body, the Head ought to be higher than the Breast, and the Breast higher than the Belly. As for the upper Extremity, the Arm ought to be placed against the Ribs, the Fore-Arm ought to be half bended, and rather prone than supine, the Wrist more stretched than bended, and the Fingers more bent than stretched.

As for what concerns the lower Extremity, the bending of the Groin ought to be lower than the
Knee,

Knee, and the Knee lower than the Foot; as also the Wrist higher than the Elbow. However there are some Wounds, which require an opposite Situation, in order to be re-united, as I shall observe hereafter.

THE second way of re-uniting Wounds consists in the Bandages, which are three in number, *viz.* the Contentive, the Incarnating, and the Expulsive.

THE first of those Bandages, which is called Contentive, serves only to contain the Dressings; and therefore it ought not to be rolled strait.

IN order to make it, the Surgeon uses a Band of different Breadths, according to the wounded Part: That Band must be rolled with one Head: It must be gently applied on the Dressings, making some Circulars, Edgings, Spirals, and Turn-overs, &c. according to the Nature of the Wound, and Figure of the Part.

THE second of those Bandages, which is named Incarnating, is proper for a recent Wound, free from the Obstacles just now mentioned, and the Direction of which is according to the Length of the Muscle. Before that Bandage be applied, the Depth of the Wound ought to be examined as soon as possible, that the Air may not have Time to act upon the divided Fibers; and if it be considerable, the Surgeon brings together the two Lips of the Wound, and applies on every Side a longitudinal Compress, which he orders a Servant to hold in that Situation. This must be done every time the Dressings are taken off; for without this Caution, the Bandage would most times prove ineffectual.

Of the uniting Bandage.

THAT Bandage, which has been called uniting or incarnating, is made with a Roller with two Heads, split in the middle according to its length, and two, three or four Inches broad, according to the part on which it is to be applied. The Operator lays the Roller on the opposite Part of the Wound, and then brings the two Heads over the Wound itself, in such a manner that the middle of the Slit corresponds exactly with the middle of the Wound. Afterwards he passes one of the Heads thro' the Slit, and holding both Heads with his Hands, he observes whether the Bandage be well placed to reunite the Lips of the Wound. He makes an end of that Bandage with some Circumvolutions round the part, till the Roller be wholly taken up.

IF the Wound was very long, I would advise the Surgeon to split the Roller in three several places, that he may first reunite the middle of the Wound with the first Convolution, and then the two Extremities by the following Convolutions.

Mr. *Arnaud*, the King's Surgeon in his Court of Parliament, heretofore Master of his Company, and Demonstrator of Anatomy and Surgery in the Royal Garden, says that a Bandage may be made in such a manner as to have the same Advantages, without its Inconveniencies. In order to this, he takes a Roller with two Heads, applies the middle of it obliquely upon the Part opposite to the Wound, and then brings the Bandage obliquely over the Wound, and having made two or three such Convolutions, he conveys one of the Heads about the upper part of
the

the wounded Limb, and the other about the lower Part. Mr. *Petit* does very much approve of that Bandage, but he will have the Roller to be split, and the two heads applied obliquely, in order to avoid the Inconveniencies that attend the first method. The longitudinal Compresses applied to both sides of the Wound make that Bandage still more effectual ; but then, as I have already observed, the Wound ought to be deep ; for, in superficial Wounds, the compresses are useless and even hurtful, and a single bandage may answer all the Indications. That Bandage is also very proper for the Extremities, where there has been a great Abscess, and where the Fat, lying in the Interstices of the Muscles has been exhausted by Suppuration, and consequently leaves empty Spaces between the Muscles ; for by those oblique Convolution, it brings together all the separated Muscles, and prevents the forming of *Sinus's*.

THE third Bandage, called Expulsive, is proper for a fistulous Wound, the bottom of which lies above its opening, in such a manner that the Matter by its natural Descent may continually come out.

SURGERY affords us three ways of reuniting this sort of Wounds. The first and the easiest, is the Bandage just now mentioned ; but before I describe it, I must suppose a Wound attended with all the Difficulties proper to give a great light to this matter.

LET us therefore suppose a fistulous Wound, the bottom of which lies in the lower part of the Arm, and the opening in the middle part. The Operator upon this occasion must search the Wound, in order to know whether it be free from the Obstacles above-mentioned ; and then he must extract the
Blood,

Blood, that may be in its Bottom, and in the room of it pour some Drops of a uniting Balsam, such as that of *Judæa*, or rather that of the *Commandeur*.

AFTERWARDS let him apply three graduated compresses. The first ought to be laid from the Bottom of the Wound, within two Lines of its Opening. The Second must be laid upon the first, and reach from the Bottom within an Inch of the Opening, supposing the *Sinus* to be long enough. Lastly, the third shall reach from the Bottom within two Inches of the Opening. Those Compresses shall be kept on with the expulsive Bandages, so called, because when it is applied upon the three Compresses, the Dimensions whereof I have just now described; it begins first with pressing the Bottom, and drives out of it what might hinder the Re-union, the purulent Matter, for instance, and so continues successively to re-unite the remaining part of the Wound.

INSTEAD of the graduated Compresses laid all along the *Sinus*, Mr. *Petit* makes use of Lint applied outwardly, as if he was filling a Wound, because the Roller going over the Lint, presses the *Sinus* in all its Parts.

IN order to make that Bandage, the Surgeon takes a Roller with one Head, with which he begins the Bandage, making a Circular somewhat lower than the Bottom of the Wound; and ascending he ends by Edgings, where the first Compress ends.

THE Operator ought to mind what I have said, that this Bandage is only proper for a fistulous Wound, the Bottom of which is higher than the Opening; and because the Wound I instance in, has

has its Bottom under its Opening, it ought to be remedied by the Situation. Wherefore, contrary to the Rules I have prescribed about Situations in general, the Surgeon must raise the Elbow, in such a manner that it may be a little higher than the Shoulder, (supposing the Patient to lie down,) that the purulent Matters may come down towards the opening of the Wound. I must observe that this Bandage ought never to be used, when there is some ground to expect a Suppuration, and when there are some Fragments or Splinters of Bones, or some other extraneous Bodies in the Wound; in a word, when there is any of those Obstacles above-mentioned, which may hinder the Reunion.

A G A I N, let us suppose a Thrust with a Sword, or any other Instrument, that makes an Opening; for instance, in the internal and lower Part of the Thigh, which penetrates into the Articulation, and that it be attended with a Swelling and Inflammation, and even with an Abscess in the lower Part of the Thigh, in the whole Knee, and in the Ham; pretty long Compresses ought then to be applied below and about the external and hinder Part of the Thigh; and because the greatest disorder is about the Ham, the Operator ought to have a very particular regard to it, and lay in a great deal of Lint, which pressing the Abscess in all its Parts, may drive the purulent Matter towards the Opening: this will succeed so much the better, as the Surgeon has a more exact Notion of the Figure of the *Sinus*. A Compress, and the expulsive Bandage, must be laid over the Lint.

I HAVE lately opened a very considerable Abscess under the Arm-pit: all the Fat under the Pectoral

ral and the *Serratus antiquus minor* was consumed; nay, there were some Cavities, that reached above the *Clavicula*, and under the *Scapula*; and I cured it in four Weeks with that ingenious way of dressing such an Abscess. But sometimes this Method of managing a fistulous Abscess does not succeed, especially when the Bottom of the Abscess is below the Opening: in such a Case, one must think of some other Means.

THE Second way of proceeding in these sorts of Wounds, is the *Counter-opening*, that one may pass a Seton, to carry off the purulent Matter, which stagnates in such Wounds. This Operation may be performed two Ways. First, if the *Fistula* allows the Surgeon to introduce the fore-finger, and if the end of the Finger touches the bottom of the *Fistula*, he may make the Counter-opening upon it; and to prevent the cutting of his Finger, he puts a Thimble upon it. That Thimble must have two small Rings, that it may be fastened to the Finger with two Threads let into them, for fear it should remain in the *Sinus*, when the Operator withdraws his Finger. Secondly, when the fistulous Cavity is so deep or so narrow that the Finger cannot be introduced into it, the Counter-opening may be made with Mr. *Arnaud's Poignard*, which is a flat silver Probe, about half a Foot long. There is a kind of Hilt at the upper Part of it, and at the lower End there are two Holes opposite to one another. There is in that Probe a Stilet of the same Figure, only it has a Button at the upper Part, and at the lower End a Lancet jutting out of the Probe about the breadth of one Finger. Mr. *Petit* has added to that Instrument a Spring,

Spring, which draws back the Lancet into the Probe; and there is upon the Probe a Groove to convey a Bistouri, or Cizars, in order to open the whole *Sinus*. The Operator conveys that Probe armed with its Stilet into the Bottom of the fistulous Ulcer, and then he thrusts the Stilet, which by means of the Lancet makes an opening: He pushes out the Probe through that Division, and draws back the Stilet only, to pass into the Holes of the Probe a Seton, which must be sometimes round like a Wick of Cotton, and sometimes flat, like a Fillet, according to the Disposition of the Wound, into which it is to be let. Afterwards the Surgeon withdrawing the Probe, brings the Seton all along the Wound. That Seton must be changed at every Dressing; which may easily be done by tying the End of a new Seton to the End of that which is in the Wound, especially to the uppermost, in order to bring it out through the Counter-opening, and to facilitate by that means the Discharge of the Matter; which can be better effected in Gun-shot Wounds than in others.

WHEN the Surgeon does not think fit to pass the Seton, he must then make some Injections. Here follows a wonderful one.

TAKE *about half a Pint of Barley-water; one third of the Balsam of Fioraventi, and an Ounce and half of the Commandeur's Balsam.*

WHEN the Seton is made use of, it ought to be removed as soon as the Suppuration is well over; and an Injection ought to be made in the room of it.

IT generally happens that the upper Orifice of that sort of Wounds dries, and closes up pretty
C fast:

fast: This a Surgeon ought to promote as much as he can, since the Matters tend downwards, and comes out at the inferior part.

THE Bandage of such Wounds must be only a contentive one.

THE third way of curing fistulous Wounds and Ulcers, is to open the Wound in its whole Length; and a Surgeon is indispensably obliged to use that Operation, when there are some Fragments or Splinters of Bones, or when the Bones are foul in fistulous Ulcers. In order to open that sort of Ulcers, the Operator makes use of a hollow Probe, closed at its lower End: He conveys it with the right Hand into the Bottom of the *Sinus*; and then takes that Probe with the left Hand, and raising it a little, he brings it all along the inward Surface of the Wound, in order to stretch out by that Means the Part that is to be cut. Afterwards he takes with the left Hand a crooked Bistouri, the Blade of which is fastened with a Fillet, to make it more steady, and laying the Fore-finger upon the Back of it, he conveys it into the Groove of the Probe, which he holds fast with the left Hand, and cuts the Parts he meets with, conveying the Instrument all along the Groove without leaving it. The Surgeon having carried the Operation thus far, leaves his Instruments, and introduces his Fore-finger into the Opening just made; and if he meets with some Bridlings, or if the Incision does not reach the Bottom of the Wound, he conveys the Middle-finger, or the Fore-finger of the left Hand, under what remains to be cut in the *Sinus*, and with the help of that Finger moving one of the Branches of his Scizars, he makes an end of the Operation.

BESIDES

BESIDES the Observation of all those Circumstances, the Surgeon must also observe whether there are any Fragments of Bones, or loose Splinters, which do not adhere to the *Periosteum*, and then looking upon them as so many extraneous Bodies, he must extract them; and if the Operation was made in consequence of a fistulous Ulcer, and the Bone is a little carious, he may ruginate it immediately, that the Patient may not be troubled a second time with the Sight of our Instruments, which never fail to frighten him.

WHAT Remains is to lay on the first dressing; and in this Case most Practitioners make use of dry Dozels to stop the Blood by filling the Wound. Mr. *Arnaud* rather chuses to use some Pieces of Linnen half worn out, pretty fine and ragged. Compresses and a contentive Bandage are laid upon the whole.

CHAP. III.

Of Sutures, with some Precepts for the dressing of Wounds.

THE third way of re-uniting Wounds recent and still bleeding, consists in Sutures, which a Surgeon must have recourse to, when the Situation of the Part, or the Bandage, cannot by themselves bring the Lips of the Wound together, because it is one of the safest Means that Surgery can afford to re-unite the divided Parts.

A SUTURE, considered as a chirurgical Operation, is a Seam made in a Wound, in order to re-unite it.

WITHOUT minding the confused Number of Sutures, which the Ancients have left us, and without insisting too much upon the Reasons alledged by the Moderns to reject many of them, I shall only mention those, that are in use among the most famous Practitioners of *Paris*.

IT is usual to make two Sorts of Sutures, the one with separate Stitches, that serves to unite the divided Parts; and therefore it was called by the Ancients uniting or incarnating. The other is made with continued Stitches, and hinders a Fluid from going out of his Cavity; and for that Reason we call it the restrictive Suture.

IT is also usual to make two Sorts of uniting Sutures: The one is called a true Suture, and the other a false one. The former can only be practised with the help of Thread and Needles: The latter, on the contrary, does not want any surgical Instrument, and consequently the Use of it is not attended with any bleeding; and therefore it is called a dry Suture. It is not much practised among the Moderns, who pretend it is only proper for superficial Wounds, which affect only the Skin. This is true, when that Suture is made with small triangular Plaisters, as it was practised by the Ancients: But when a Surgeon makes use of large Plaisters, which reach pretty far beyond the Wound, to draw the Flesh as well as the Skin, the Bottom will be reunited as well as the Outside, and consequently that Suture may cure a Wound even in the Muscles. I shall alledge so many Instances of its good Effects from good Practitioners, that Surgeons will be forced to revive it.

BEFORE

BEFORE a dry Suture be made, in any Part whatsoever, care ought to be taken to shave the Skin in all those Places where the Plaisters are like to reach, not only because the small Hair hinders the Plaisters from sticking close to the Skin, but also because it occasions a great Pain, by hindering the Plaisters from being easily taken off after the Cure.

THERE are two ways of making that Suture: the one, wherein the Operator uses two Plaisters together with Ligatures, and the other wherein he uses but one Plaster without Threads.

TO put the former into Practice, the Surgeon cuts two Pieces of new Linnen, of a bigness proportioned to the Depth of the Wound; for the Plaisters must be larger or smaller according to that Depth: The Pieces of Linnen having their Selvage next to the Wound, must be covered with a Plaster of *Andreas a Cruce*, which is a very good one; and three or four Threads must be tied to the Selvage of the Linnen, according to the Length of the Wound.

THE Operator warms those Plaisters a little, and applies one of them on each Side, at a Finger's Breadth from the Edges of the Wound, that he may the better re-unite it, and apply upon it the necessary Remedies. Afterwards he brings the two Lips of the Wound together, and applies upon it a Plaget dipt in an agglutinating Balsam. A Servant keeps the Wounds in that Situation, whilst the Operator fastens the Ends of the two Plaisters with a single Knot, and a Loop, which he makes at each Thread. He puts upon each Plaster a longitudinal Compress, and above them another Compress split in the Middle, and a contentive Bandage.

THE very next Day the Surgeon must examine that Wound; and if the Suture be relaxed, he must straiten it by tying the Threads closer: But if it be not relaxed, he only moistens the Plaget with some Drops of the same Balsam, and applies the same Compresses and the same Bandage.

THE second way of making that Suture is with a single Plaister without Threads. The Plaister, as I have just now said, must be proportioned to the Depth of the Wound, that is, this Plaister being as large as the two others together, it must surround at least the two Thirds of the Part.

MR. *Petit* leaves a Hole in the Middle of it, not only that one may see whether the Wound be well reunited, but also that one may apply some Remedies to it. The Surgeon warms the Plaister, and presently applies one of the Ends upon one Side of the Wound, laying on it the Palm of his Hand in order to heat it. Afterwards he re-unites the Wound, and applies the other End of the Plaister upon the opposite Part. He lays above the Holes of the Plaister a Plaget dipt in some agglutinating Balsam, and then the Compresses and Bandage, as I have just now said.

THE true Suture is further looked upon as simple, and compounded: the first is made with Thread and Needles: Such are the intersected and twisted. The compounded Suture is that, which besides Thread and Needles, requires also some other Bodies: Such is the quilled.

LASTLY, the second sort of Suture being made without Intersections, is like that which the Skinners make to sow their Skins; and therefore it is called

called the *Skinner's Suture*: It is used in the Wounds of the Intestins.

AMONG the true and incarnating Sutures, the intersected is the most considerable. That Suture is proper for a Wound of a small Depth, whether it be longitudinal, transverse or triangular, provided it be free from the Obstacles mentioned in the foregoing Chapter.

To make the intersected Suture, I suppose a Wound crossing the Fore-part of the Thigh, about three Inches long, and penetrating not only into the Teguments, but also about two or three Lines into the Body of the *Gracilis*. In order, I say, to perform this Operation in such a Wound, the Surgeon must first of all prepare the *Apparatus*, which consists, besides the usual Dressings, in having crooked Needles, which are generally proper for all the Parts, whereas the strait ones are only proper for certain Parts, and for Wounds that go no deeper than the Skin; nor are they used with the same Ease as the crooked ones. Afterwards the Operator must have some even and soft Thread, of a Bigness suitable to the Wound, as well as the Needles, which ought to be of a different Bigness and Length, according to different Wounds. The Surgeon uses also Threads of a different Bigness, according to the Resistance which the Lips of the Wound can make; and besides waxes them, not only for a greater Safety, but also that they may pass more easily through the Parts, and lest they should be imbibed with the Moistness, which might occasion an Erysipelas in the Skin; and not, as some pretend, lest they should corrupt, since after many Operations, and after they have been long

in the Wound, they are taken out without being damaged in the least. It is also proper that the Surgeon should keep the Lips of the Wound steady with the *Cannula*, whilst he makes the Suture, though the Fingers, as far as they can be used, are always the most proper and the safest Instruments.

THE *Apparatus* being thus prepared, the Surgeon shall take care to clear the Wound of all the Clods of Blood, and other extraneous Bodies, that might be in it: Afterwards he must bring the Lips of the Wound together, and make a Servant to hold them in that Situation, whilst he takes with the right Hand a Needle, (supposing the Wound such as I have just now described it,) threaded with a small Fillet suitable to the Depth of the Wound, and more or less strong, according to the Resistance that may be expected from the divided Muscles, as I shall say hereafter. And then conveying the Point of the Needle about three or four Lines from the Edge of the upper Lip of the Wound, or, to speak more properly, of that Part of the Muscle, which contracts most; and being in the Middle of the Division, he shall apply the Fingers of his left Hand to support the lower Lip much at the same Distance, and in the same Place, and he shall drive the Needle so as to pierce in depth a little lower than the Middle of the Division, in order to avoid an Abscess, taking at the same Time, and with the same Stitch, the two Edges of the Wound. The Needle being passed, the Fillet must be drawn till what remains of it, does not exceed the Length of five or six Inches above the upper Lip; and if the Wound is considerable enough to require three Stitches, they must

must be made at once, and the Thread, or small Fillet must not be cut till the Stitches be made; because if it be cut after every Stitch, the Patient fancies that the Operation is performed the first Time the Needle is passed, and his Fright, as well as his Pain, encreases when he is pricked a second and a third Time. The two other Stitches must therefore be made all together, on each Side of the foregoing, and with the same Rules, leaving after every Stitch as much of the Fillet as will be necessary to tie them, and then they must be cut in the Middle.

BEFORE Mr. *Petit* had taught this Method, the Surgeon cut the Thread after every Stitch; which is the Reason why that Operation was called the intersected Suture.

IF the Extent of the Division does not require three Stitches, the Operator shall not begin the first in the Middle, but at some Distance from it, and the second at the same Distance on the other Side, directing the Punctions so well, that there be not a greater Distance between the two Stitches, than from the Stitches to the Extremities.

IF the Wound has an Angle, the Surgeon begins with the Angle: If it has two Angles, he begins with the most solid: Lastly, if it has many Angles, he must always begin with them, and always with the most solid. If the Distance from one Angle to the other be too great, he must make a Stitch between both.

IF the Wound is like the Figure of a T, or Quadrangular, two Stitches will be sufficient to reunite it, without cutting the Thread between those two Stitches.

THE Operator begins the first Stitch in the lower Part of one of the Arms of the T or †, and piercing, as I have said, at the same Time the two Lips of the Wound, he draws the Needle through the upper Part of the same Arm, and at the same Distance. Afterwards laying two Fingers of the left Hand upon the Sides of the Fillet, which comes out above the upper Lip, he draws it gently till what remains of it be not above four or five Inches long under the lower Lip; and without quitting the Needle, he passes it through the other Arm with the same Caution, (only with this Difference, that he begins to pierce the Skin above the upper Lip;) and then he makes some Knots, and a Loop upon the Body of the T or Cross, which does perfectly re-unite that Wound, &c.

IF those two Stitches, which are in the Center of the Division, do not well reunite the Extremities, a Stitch may be made in them.

THE Surgeon having carefully considered all the Circumstances I have just now mentioned, must take the End of the Fillet hanging under the lower Lip, (I mean that which is in the Middle, if there are three Stitches,) and bring it over the upper Lip to tie it with the other End of the same Thread. He makes a single Knot, that he may the more easily loosen it, in case any Accident should happen.

ALL those, who have writ concerning chirurgical Operations, advise to lay a small Compress upon that first Knot; but Mr. *Thibault*, sworn Surgeon of *Paris*, and Major of the *Hotel-Dieu* by Reversion, rather chuses to use a small Roll of waxed Taffety, not only because it is more convenient

venient and more solid, but also because it will not be imbibed with the Matters, that continually come out of the Wound. By which Means one may prevent an Erysipelas, which frequently happens in the Skin, when Linnen Compresses are made use of: This is no small Advantage, since an Inflammation does very much hinder the Re-union of Wounds. Which is also the Reason why the Threads are tied over the upper Lip of the Wound, as being the most solid Place, and such as is least exposed to the discharge of the Wound.

THE Operator makes a single Knot upon the Roll of waxed Taffety, and a Loop above the second Knot. He must observe the same Method in Relation to the other Threads, taking care not to tie them too strait in the Beginning: This last Circumstance ought to be generally observed in all Sutures.

AFTERWARDS the Surgeon must dress the outside of the Wound. He must first of all lay upon the Knots a small double Compress made of Linnen, and then upon the whole Extent of the Wound a Plaget, dipt in the same Balsam, which has already been introduced into the Wound, after having taken out the Clods of Blood: Lastly, he must put over it one or two Compresses according to the different Parts; the whole being supported by a Bandage only contentive, which consequently ought not to be tight.

I do not use Plaisters, because they hinder the purulent Matters from coming out of the Wound, or because by letting them stagnate upon it, they heat the Skin, &c. and prevent Transpiration.

Lastly, after having performed the Operation, and applied the Dressing; the wounded part must be

be placed in a proper Situation, and the Patient blooded, if necessary. The Surgeon must prescribe Glisters, when the Patient is costive, and order him to keep himself quiet, which very much contributes to help Nature in her Operations.

THE Operator does commonly leave that Dressing two whole Days without taking it off, unless some Accident happens, as shall be said hereafter; and then he gently takes off the Roller, and compresses, and if they stick a little, he moistens them with warm Wine: lastly, he observes whether the Plaget sticks to the Wound, whether the Wound be inflamed, whether the Patient felt a great Pain, &c. and if none of those ill Presages appear, he pours some Drops of the same Balsam upon the Plaget, puts on again the Compresses and Bandage for two Days more; and such Wounds are generally reunited, or in a fair way to be so, after some Dressings repeated in the same manner, unless any extraordinary Accident should happen.

THERE is still another sort of Wound, which requires the intersected Suture. I place under that kind of Solution of Continuity the Wounds with hanging Lips, which are generally occasion'd by cutting or bruising Instruments. The former may hurt all the parts of the Body; but it seems the latter cannot make such a Wound as we here suppose, but when the Blow falls slanting; which frequently happens upon the Head.

THOUGH the Wounds, occasion'd by bruising Instruments, require none of those Operations which we have already mentioned, *viz.* the Situation, the Bandage, and the Sutures; yet because they are not
bruised,

bruised, I shall not scruple, in imitation of the best Practitioners, to make Stitches in them.

WHEREFORE let us suppose a Wound in the fore and upper part of the coronal Bone, which has a hanging quadrangular Lip, and the two lower Angles whereof stick to the Skin. In order to cure that Wound, the Surgeon must wash it with warm Wine, raise the Lip speedily, and make it level with the other Parts. He must make two Stitches, one in each Angle, remembring all the Circumstances above mentioned: But in such Wounds as this, he ought particularly to direct his Needle in such a manner, that the first Stitch, which must be in one of the Angles of the Lip, may take in its whole Thickness; but the second, which shall be in that part of the Head that is not loose, shall only pierce the Skin to avoid the Aponeurosis of the frontal and occipital Muscles, and to prevent by that means those accidents, which frequently happen, as Mr. *Arnaud* observ'd in a Person, to whom that Suture was made. The Needle reaching beyond the hairy Skin, pricked the Aponeurosis of those Muscles: the Head swelled soon after, and was inflamed, especially before and behind: He cut the Suture; and two Hours after, all the Symptoms vanish'd.

THE Operator, without quitting the Needle, makes the second Stitch in the other Angle of the Wound, observing the same Circumstances: But because in that sort of Wounds the Skin of the Sides contracts it self, especially that which has a hanging triangular Lip, it is not improper to make some Stitches, which must not be tied strait before the Suppuration be well formed, to avoid an Erysipelas, which most commonly happens, and hinders

ders more than any thing else the Re-union of the Wound.

THE Operation being perform'd, the next thing is the Dressing, which must only consist in pouring several Drops of some uniting Balsam upon the Circumference of the Wound, and then applying a Plaget dipt in the same Balsam, or covered with a good Digestive: That Plaget must reach a Finger's breadth beyond the Circumference of the Wound.

WHEN the Surgeon applies the Plaget upon this sort of Wounds, he must first of all lay the lower part of it a Finger's breadth under the lower part of the Wound, and by a successive Application of the remainder of the Plaget, the Lip is brought towards the upper part. The same Caution ought to be used with respect to Plaisters, if any are laid on, and in relation to the Compresses, the Disposition whereof depends upon the Surgeon's Skill. The Bandage must be only contentive, and surround the Head without compressing the Ears; and the *Couvre-chef*, which I shall describe elsewhere, must be laid over it.

PHLEBOTOMY will be of good use to prevent an inflammation. The Patient must not be allowed to speak, because the Motion of the Jaw and Temporal Muscle give Concussions to the Wound; from whence it follows, that he must have no other Food for three or four Days but Broth very nourishing, which he shall take with an open and flat-ted Spoon. That time is sufficient to reunite the Wound, or will put it in a good way of being soon reunited.

WHEN the Surgeon takes off the dressing of that sort of Wounds, he must, as he did in applying it,

End of the

endeavour to bring the hanging Lip near the upper part of the Division ; and therefore a prudent Operator ought to take off the Dressing by its lower part ; and with this Caution, the Lip seems to be brought nearer the Parts to which it was continuous before the Wound. The same Caution ought to be used with respect to all other Sutures, that the Surgeon may not run the hazard of renewing a Wound, which he endeavours to cure.

I attended once a Wound with a hanging Lip of a quadrangular Figure ; but it was quite different from the Wound, which I have just now described. It happened to a Youth of sixteen Years of Age, who being kicked by a Horse in the lower part of the Chin, had the whole *Quadratus* divided from the Jaw-Bone, and the hanging Lip, which was at least every way two Fingers broad, stuck only to the lower Lip. That Wound afforded a great deal of Blood, a small part of which, as it coagulated, stuck to all the Edges of the Wound ; which preserved from the Injuries of the Air the Jaw-Bone, that was partly denuded. A young Surgeon had a mind to cut off the hanging Lip, which did, as it were, jut out ; but a Person very zealous for the Patient sent for me. I consider'd the Wound, and without blaming that young Surgeon, I said it might be cured more speedily, and with greater Safety and less Deformity without cutting off the Lip.

In the first place, I moistened the Wound with a fine Rag dipped in warm Wine, and endeavoured to take off all the coagulated Blood with all possible Dexterity and Speed. Afterwards I laid the hanging Lip level with the other Parts, and made in the lower part of the Wound two Stitches,
one

one in each Angle. Having well reunited that Division, I poured upon the Circumference of the Wound some Drops of the Balsam of the *Commandeur de Parne*, and covered the whole with a Plaget dipt in warm Wine, and armed with a Mixture of Terebinthine and the same Balsam.

WHEREAS in the Wound of the Head with hanging Lips, abovementioned, Surgeons usually begin with applying the Dressing in the lower part, I began with the upper part, and directed with the Finger the Plaget towards the lower part, in order to facilitate the Descent of the loose piece. I put on a Compress dipt in warm Wine, and slit in the middle, and above it a Bandage called the *Sling*, the upper Head of which I applied first to the lower part of the Chin. I took care to tie it strait, because the Reunion did chiefly depend upon it ; but I fastened the lower Head loosely, to prevent the raising of the hanging Lip, and to facilitate the Discharge of the Matters.

I blooded the Patient immediately, forbad him to speak, and ordered those who tended him, to give him a glister in the Evening, and to nourish him only with Broth taken every two Hours with an open Spoon. The third Day I took off the Dressing, removing every Piece first by its upper part, to avoid giving any Motion to the loose Piece, and to facilitate the Reunion of it. I found the Wound so well reunited, that I resolved to cut the Stitches. Afterwards I laid again a Plaget dipt only in the *Commandeur's* Balsam, and the rest of the *Apparatus*, as before, which was left on three Days longer ; so that on the seventh Day the Wound was so well cured, that the Scar could not be perceived

ceived but by those, who were very near the Patient.

I should now, according to the Order of my Discourse, treat of the twisted Suture; but because it is usually practised for an Operation called the Hare-Lip, I refer it to the Operations relating to the Head, and shall here speak of the compounded Suture, which, as I have said, differs from the simple one, because, in order to make it, something more is requisite than Thread and Needles.

WE have reckon'd among these sorts of Operations the quilled Suture: It is wholly rejected in modern Books, and condemn'd as being useless and too cruel: But the learned Surgeons, whose Names are an Ornament to this Treatise, say that the quilled Suture is the safest way of reuniting those Wounds, wherein the Muscles are deeply cut, and the Parts naturally disposed to recede from each other, either by their own Weight, the Elasticity of their Fibres, or the continual Motion to which they are liable, as it may happen in the deep Wounds of the *Glutei*, and of the Muscles of the Thighs, Legs, and Arms, and in the great Wounds of the *Abdomen*.

FOR an instance of the quilled Suture, let us suppose again a Wound in the forepart of the Thigh, but such as is five or six Inches long, and seems to cut a considerable part of the *Gracilis*.

THE first thing a Surgeon ought to do towards the Cure of this sort of Wound, is, as in all others, to take off the grumous Blood, which hinders the Reunion. Afterwards he must place the Part in a good Situation; and the most proper in this Case is to bend the Thigh, in order to bring together the

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Lips

Lips of the Wound, that are asunder, by the natural Spring of the divided Fibers, which shrink, as it were, into themselves.

AFTERWARDS the Operator must take a crooked Needle of a proportioned Bigness, and such as contains the requisite Conditions, which I shall describe at the End of this Treatise, when I come to speak of all the Instruments proper for a Surgeon. That Needle ought to have a particular Thread, and not a Lace, or a Fillet woven with Thread, which has been used hitherto; because the Lace being round, acts only upon one Point, and consequently cuts, especially when there happens an Inflammation, which is an usual thing. A Fillet woven with Thread is liable to much the same Inconveniencies, by reason of its two Edgings, which cut the Parts. Those Fillets are also very troublesome, because in a twisted Suture four Ends of them must be passed through every Stitch; which gives the Surgeon a great deal of Trouble, pains very much the Patient, and occasions an Inflammation in the Wound.

MR. *Petit* uses with less Trouble, six, eight or ten white Hemp-threads, laid together one by another, and waxed all at once. By that Means he has a Fillet, the Edges whereof are free from the Inconveniencies attending common Fillets: It is flat, even, and soft, and useful in several other Respects, as I am going to shew.

A SURGEON must have many such Fillets of different Breadths, that is, made up of more or fewer Threads, according as he desires they should be stronger and broader, always taking care that a double Fillet be not so big as the Needle, that
he

he may the more easily pass it through the Parts. But the Thread ought to be different, according to the Difference of Wounds; for in the deep Wounds of the great Muscles, Surgeons use a sort of Thread, called *Bretagne-thread*, and known in this Province by the Name of twisted Thread. As for Wounds not very deep, or that are in tender Parts, they use a white Thread, which Seamstresses call *Fil d'epinay*.

BEFORE the Needle be thrust into the Wound, a prudent Surgeon ought to put his Finger in the whole Extent of the Division, in order to feel whether there are any Arteries crossing the Muscles, that he may avoid to open them when he makes the Suture. This Caution is used by Mr. *Arnaud*; and ought to be used in all the transverse and deep Wounds of the great Muscles, that require a Suture.

ALL those Circumstances being duly observed, what remains is to perform the Operation in the following Manner. The Surgeon must pierce with a Needle, and all at once, the two Lips of the Wound, taking more of the Skin than of the Fat, because the Skin contracts afterwards by its Spring, and the Fat being re-united, the Wound gapes, and the Scar is deformed notwithstanding the Suture.

THE Operator must begin with the Middle of the Wound, if it be large enough to require three Stitches, and with the Lip answering the Origin of the Muscle, because it contracts most. Afterwards he drives the Needle pretty far into the Parts, that is, about two Thirds of the Depth of the Wound, and even deeper. For Instance, if it was

about one Inch and half deep, the Needle should be driven into it to the Depth of one Inch, and more, that the Surgeon may bring the Bottom of the Wound together, and not suffer one Drop of Blood to remain in it, because that Blood, being out of the Course of the Circulation, would ferment, and quickly occasion an Abscess.

THAT Stitch being made, the Surgeon must make two more, one on each Side of the first, without quitting the Needle, or cutting the Fillet, before all the Stitches are made: However they ought not to penetrate so far into the Part, because the Extremities of the Wound are never so deep as the Middle.

THESE Rules appear to me sufficient, because by their Means the Bottom of the Wound will be perfectly united, as well as the Out-side. On the contrary, if the Needles were driven into the Bottom of the Wound, or beyond it, as some would have it, the Out-side of the Wound would remain gaping, and the Fibers being asunder, their Extention would require a longer Time, and the Scar would be more deformed.

AND if the Needles were only driven superficially, or at most into the Middle of the Division, according to the Opinion of other Surgeons, there would remain a Bottom, which would quickly be attended with an Abscess, that might even occasion a *Sinus*.

IT being very difficult to pierce the Skin with Needles, especially that of the *Abdomen* and deep Wounds, some advise the Use of a Port-Needle; but then it must be very small.

MR.

Mr. *Petit* has invented an Instrument like a Ring; in the outward Circumference of which there is a small Peg, about which a small Pivot turns, made hollow like a Funnel to put in the Head of a Needle. That little Pivot is riveted with the Ring by means of the Peg, so that it turns like the Nave about an Axle-tree. This Instrument is very convenient, and proper in most Sutures, without giving the Surgeon any trouble.

Now the Operator must apply the Instruments, to make the compounded Suture. They are called Pegs, and differently made, according to most Books. Some make use of a Roll of Linnen; but those Pegs being imbibed with the Matters continually issuing from the Wound, occasion an *Erysipelas*, which obliges the Surgeon to cut the Suture. Others, to prevent this Accident, use a waxed and rolled Taffety, which indeed will not be imbibed with the Matters, but it presses the Wound only in the place where the Stitches are; which occasions still some Vacuities between every Stitch. Lastly, Others make use of more solid Bodies, such as Quills, &c.; but those Instruments being applied upon such a round part as the Thigh, wound the Extremities, and bruise the Middle.

ALL those Inconveniencies moved Mr. *Arnaud* to make use of two Pieces of very small Wax-candles, which adapting themselves to the Figure of the Part, may also, by their solidity, answer the Surgeon's intention. But he finds another inconveniency in it; for those small Wax-candles growing hot, melt, and the Thread he makes use of, gets into them, and loosens the Suture. To prevent this Accident, he rolls, about each piece of a Wax-

candle, a small piece of waxed Taffety, which he fastens with the Plaister of *Andreas à Cruce*. That small Roll is soft, and adapts it self to the Figure of the Part. It cannot be imbibed with the Matters issuing from the Wound. It compresses the Wound equally in all its Parts, and does not relax.

Having thus fitted two small Pegs, the Surgeon must make a Knot at each end of the Fillet, which reaches beyond the upper Lip of the Wound, and divide the Threads of which that Fillet is composed, between the Knot and the Wound; whereby Loops are made, into which the Surgeon passes one of the Pegs; and then putting two Fingers upon the lower Lip, one on each Side of every Stitch, he draws all the Fillets one after another, beginning with the middle one, that he may perfectly bring together the divided Parts. Afterwards he divides each Fillet of the lower Lip into three, two of which will serve to tie the second Peg: He makes a single Knot with the middle Fillet upon the Peg, and then brings the Lips of the Wound together with all possible care and dexterity. He always makes single Knots in the other Fillet, remembering the general Observation about all Sutures, *viz.* that they must not be tied too strait in the beginning. Lastly, he makes Loops above those Knots.

In the next place, the Surgeon dresses the Outside of the Wound, which does not require a great *Apparatus*. Mr. *Duverney*, Doctor of Physick, Professor of Anatomy and Surgery in the King's Garden, and Member of the *Royal Academy of Sciences*, advises to put upon it a Plaget, dipt in the Balsam of *Fioraventi*, or *Copahu*, or in the Essence
of

of *Terebenthine*. I should think the *Commandeur's* Balsam would be of very great use upon this Occasion, because it consists of oily, balsamick and volatil Particles; and because as it dries upon a Wound, it forms a kind of Crust, which keeps the Air from getting into it, and by that means procures a speedy re union.

THE Stitches being pretty deep, the external Parts swell a little; and therefore it is not improper to tie above the Plaget the third Thread of each Fillet with its Antagonist, in order to compress the Outside of the Wound, taking care however not to tie it too strait.

THE Surgeon puts above that Dressing some Compresses dipt in a proper Liquor, and supports the whole with some Convolutions, which tend, as well as the Suture, to keep the two Lips of the Wound together: he begins that Bandage with two or three Circulars, somewhat below the under Lip of the Wound, and goes on upon the upper One by making Turn-over's opposite to the middle of the upper Lip, to bring the two Lips near each other. Afterwards he descends behind the Thigh, and makes a Circular above the lower Lip; so that, according to this Description, the Turnings which are in the Part opposite to the Wound, ought almost to cross one another.

THIS being done, the Part must be placed in a proper Situation; and the Surgeon does not neglect to use the general Remedies, which he may think necessary.

HE must, in the first Days, take off the Roller, and the Compresses, in order to examine the Circumference of the Wound; and if the Skin be in a

good State, if the Patient does not feel too great a Pain, or a considerable Pulsation at the Bottom of the Wound, the Surgeon does commonly leave on that Dressing six or seven Days, more or less according to the good Constitution of the Patient, in short, till it appears that the Wound is well reunited.

IF the Surgeon perceives in the first Days, that the Suture is too loose, he may straiten it a little, and loosen it, if it be too strait.

LASTLY, if the Lips of the Wound appear somewhat bruised, a gentle Suppuration for four or five Days, lessening the Bulk and Tension of those Lips, will prevent an *Erysipelas*: This may be effected by using digestive Ointments, and *Arcæus's* Balsam.

WE frequently see after these Sorts of Operations, that there happens an Itching in the Skin, a great Pain in the whole Member, an *Erysipelas*, a considerable Inflammation, a Fever, and a *Delirium*. The Surgeon must not then be frightened, but only untie the Loops, that are upon every Stitch, loosen the Knots, put upon the Wound a Plaget, armed with a Balsam that will excite a gentle Suppuration, such as *Arcæus's* Balsam, or some other, according to the Experience of the Surgeon, and blood the Patient plentifully, without neglecting Glisters, Chicken-broth, and diluting Diet-drinks, &c.

THOSE sad Accidents being over, the Stitches must be straitened by Degrees, that is, about one Line every Day, and the Wound must be dressed, as I have already said.

ON the contrary, if those Accidents continue, and even encrease, such as the Tension of the Part, and the Inflammation, then, without any Hesitation, the Sutures ought to be cut, and the Wound dressed as usually.

LASTLY, if the Industry of the Operator has been attended with a good Success, and the Wound is re-united, his Prudence and Dexterity must also enable him to cut the Stitches of the Suture. His Prudence will teach him when 'tis time to cut them. He will know it, when he sees the Thread or the Fillet very loose in the Divisions made by the Needle. And if in this Case the Re-union is not perfected, the Suture is no longer of any Use. A further Proof of a perfect Re-union is, when the Scar appears like a fleshy Line, somewhat red, a little raised, even, and without Pain.

THE Dexterity of the Surgeon will teach him to cut the Sutures safely, and to take off the Threads; which he does, if it be the intersected Suture, by putting a small Probe under the Thread, with the help of which he cuts it near the Knot with the Point of the Scissars. Afterwards he puts his Fingers upon the lower Lip on each Side of the Stitch, and with the other Hand he draws the Thread by the Knot; and with this Method he safely takes off the several Stitches, without running the Hazard of renewing the Wound.

THE next thing is to cure the small Divisions made by the Needle, which may be done in a little Time, by pouring upon them some Drops of the *Commandeur's* Balsam, and laying over them a Compress, dipt in warm Wine.

If the Accidents are such, that the Surgeon thinks himself obliged to cut the Sutures, in order to avoid a greater Disorder, he must, as I have already said, dress the Wound in the same Manner as Wounds without Suture; which gives me Occasion to set down many general Precepts proposed by the learned Mr. *Duverney*.

Precepts necessary for the well dressing of Wounds.

I. Precept. One must avoid the Method of some Surgeons, who probe Wounds at every Dressing, and thereby make small Wounds every time they use a Probe, by tearing or compressing the Extremities of the small Tubes, which are very soft and tender.

II. Precept. Great Incisions ought not to be made without Necessity, for fear of encreasing the Wound. The Surgeon ought to make them only, when tis necessary to evacuate the purulent Matter, or to take out some extraneous Bodies, or some fragments of Bones broken or carious.

III. Precept. The Operator must dress the Wound softly, and without exciting any Pain, forbearing to introduce into the Wound Dozels, Tents, and other dilating Bodies, which stopping the small Tubes occasion Inflammations. It plainly appears that all those things are contrary to Nature; for when a Wound thus filled is uncovered, the Dozels and Tents come out of it all at once.

IV. Precept.

IV. *Precept.* A Tent is absolutely necessary after the *Gastrorhaphia*, when the Surgeon has made the Ligature of the *Epiploon*, or the Suture of the Intestin, or the Operation of the *Bubonocèle*, or in the dressing of a *Fistula*: But Tents ought not to be used, when they appear needless, especially in the Wounds of the Joints.

I shall shew in the next Chapter, that this Precept ought to be observed only in some *Fistula*'s, and that the use of Tents is repugnant to Nature and the Design of the Surgeon.

V. *Precept.* The Dressings ought to be speedy, in order to avoid the Impression of the Air, which coagulates the Juices and the Blood of the Extremities of the Fibers, and of the small Vessels, and thereby occasions several Obstructions attended with Inflammations, and consequently with great Pains, and even with a Fever.

VI. *Precept.* Wounds ought to be dressed but seldom, that Nature may have Time to produce the small fleshy, bony, or tendinous *Papillæ*, which ought to fill up the Wound. One must dress at least twice a day those Wounds, that suppurate much, especially in Summer, to avoid the Corruption, a *Gangrene*, &c.

VII. *Precept.* The Wound ought to be gently wiped, for fear of taking away the nutritive Juice, which must repair the lost Substance, and occasioning a Pain, by irritating the nervous Fibers of the Wound.

VIII. *Precept.*

VIII. *Precept.* Rottening Ointments ought to be used as little as possible.

IX. *Precept.* Fat and oily Remedies ought not to be used in those Wounds, wherein there is an Inflammation or an Erysipelas, because locking up the Pores, they prevent Transpiration, and encrease the Disease.

X. *Precept.* Spirituous Remedies ought to be laid aside, when the Suppuration is in a good way, because they harden the Extremities of the small Vessels, and occasion a reflux of Matter. On the contrary, gentle and balsamick Remedies ought to be used, such as the Balsams of *Fioraventi*, and *Copahu*, the *Essence of Terebenthine*, &c.

XI. *Precept.* Injections ought never to be used but in deep Ulcers, wherein there is a *Sinus*, into which the Medicaments cannot be conveyed; and when they are used, they must be pumped immediately. Wherefore I propose a Pipe ending like a Nipple, capable of being exactly applied upon the Wound, adapting to the broad End of it a Syringe; and with the help of its *Embolus* all the Juices, which happen to be extravasated in the Wound, ought to be extracted.

WHAT is called dressing by charm, is what a sucking Man does by drawing and pumping the Blood and the Lymph; and then he puts a good Compress upon the Wound, and leaves it on five or six Days without taking it off. Some add
Words

Words to the Suction ; but it is only to impose upon the People. It may be observed by the by, that this Practice does not succeed but when there are no large Vessels opened, or when the Bones are not fractured.

XII. *Precept.* One ought to prevent or destroy the Callosity, which shuts up the Extremities of the Tubes, and keeps them from pouring the nutritive Juice to repair the lost Substance.

XIII. *Precept.* A *Seton* ought to be used, when the Wound is quite thorough, to convey the Remedy within the Wound, and hinder the Lips from being re-united sooner than the Bottom.

XIV. *Precept.* The Compresses ought to be imbibed with some warm Liquor, such as Wine, or some Fomentation, when the Dressing is to be taken off, that they may easily be loosened, and no Divulsion be made in the Fibers of the Wound.

XV. *Precept.* Plaisters ought to be used as little as possible, because they close the Lips of the Wound, and hinder Transpiration.

XVI. *Precept.* Wounds ought not to be rolled strait, since the Bandage is only designed to keep on the Remedies, (excepting however longitudinal Wounds, to bring remote Lips together;) for Compression hinders the Circulation.

XVII. *Precept.* Lastly, the Surgeon ought to use evacuating, and lenitive Remedies, such as
Phlebotomy,

Phlebotomy, Glisters, Diet-Drinks, Emulsions, &c. Vulneraries are proper, when the Blood is thick and clogged with a Chyle of the same Nature; but then there ought to be no Inflammation in the Wound. They are also proper in the Wounds of the *Viscera*. The best way of giving them is to make a thin Decoction of vulnerary Plants, and to put a spoonful in each Glass of the Patient's usual Drink.

IN some cases the purulent Matters return into the Blood, without occasioning any Disorder in it; but sometimes they are the Cause of very sad Accidents.

IN the first Case, the purulent Matter having a good Consistence, remains in the Blood, and is evacuated by Stool and Urine; for it ought to be known and we are sure of it by Experience, that *Pus* is only pernicious accidentally, and that when it is well tempered, soft and balsamick, it cannot occasion any Symptom by mixing with the Mass of the Blood; but when it is ill-prepared, it excites by its sharpness and bad Quality irregular Shiverings, a Fever, and extraordinary Pains.

IT has been observed that after some Wounds, not only in the Head, but also in all the other parts, an Abscess was formed in the Lungs and the Liver, by the reflux of the purulent Matter into the Mass of the Blood. If the Matter is more apt to stop in those *Viscera* than in other parts, 'tis because they are fuller of Veins.

ONE may know that the Matters are gathering in the Liver, and occasion many small Abscesses in it, by the Pain which the Patient feels

in that Part at the time of the shivering, and in the Lungs by a Stitch in the Side, and a very great Oppression.

THOSE sad Symptoms happen by the Patient's Fault, and the Surgeon's Ignorance. The sick Person contributes to them by his unruly Passions, an ill Course of Diet, and immoderate watching; and the Surgeon by his ill dressing, by filling the Wound, exposing it to the Air, wiping it too carefully, or using spirituous Remedies (when the Suppuration is laudable: All those things make the Matters purulent, and carry 'em back into the Mass of the Blood; which may be known by a dry, blackish, livid, and stinking Wound. In this Case, the Surgeon ought to take another Course: He must use, for a Topick proper to restore the Suppuration, some soft and balsamic Remedies, such as those which I have already mentioned more than once; and the Patient must take inwardly *Cordials*, *Vulneraries*, *Febrifuges*, *Diuretics*, or *Diaphoretics*, according to the Exigency of the Case.

LASTLY, if the nutritious Juices are acrimonious and salt, the Wound cannot be closed up; which ought to be prevented by Purgatives, and by lenitive and incrassating Remedies.

WHEN *Hippocrates* said that Wounds of a round Figure could never or hardly be cured, he meant those that have callous Edges; for we see that the Extirpation of the Cancer, Amputations, and other Wounds are easily cured.

TO put an end of what concerns the Cure of Wounds in general, it ought to be observed, that the Evenness and Insensibility of a Scar, are a Sign that the Wound is well cured; because 'tis a Proof
that

that there are no extraneous Bodies under the Scar.

WHEN the Pain is quite over, and the Part moves freely, 'tis also a Sign of a perfect Cure.



CHAP. IV.

Of the Gastrorhaphy.

TO follow the anatomical Order, which commonly begins with the Parts of the *Abdomen*, because they are more liable to Corruption, I shall now treat of the Operations performed in that part of the Body.

THOSE Operations are of several sorts, and performed to cure very different Diseases, such as simple or complicated Wounds, Tumors of different kinds, and which require different Operations, *Fistula's*, and Abscesses.

HAVING named Wounds before the other Accidents, I shall in the first place discourse of the *Gastrorhaphy*, which is the Operation proper for them. That Word is derived from two *Greek* Words, *viz.* γαστήρ, which signifies the Belly, and ραφή, which signifies a Suture or Seam. Wherefore the *Gastrorhaphy* cannot be better defined, than by saying, that it is a Suture made in the Belly, to prevent the floating parts of that Cavity from coming out, whether they have or have not been redcced, provided the Wound be large enough to require a Suture.

AMONG the Wounds incident to the *Abdomen*, some are simple, and others complicated. All those

those who have treated of chirurgical Operations, reckon among the simple Wounds of the *Abdomen*, those which do not penetrate into the Cavity : On the contrary, complicated Wounds, in the Opinion of those Authors, are those, that penetrate into the Cavity. As for me, I understand by simple Wounds only those, that are attended with no Accident ; for there are Wounds, which do not penetrate into the *Abdomen*, and yet are very much complicated ; such as those, which affect the *RECTUS Abdominis*, and frequently occasion an Abscess between it and its *Aponeurosis*. This sort of Wounds, or to speak more properly, the Accidents that follow them, require from a Surgeon a great Knowledge of the Structure of those Parts, that he may well direct the necessary Incisions.

AND though the outward Membrane of the Sheath be the only Part glanced upon by the Point of some Instrument, I am persuaded there will be some Inflammations in it, which may be attended with a Gangrene, whereof those membranous and tendinous Parts are very susceptible, unless the Surgeon speedily unbridles and relaxes the Muscle with Incisions every way. Wherefore the Cure of this sort of Wounds requires a much greater Care and Attention than that of the mere Divisions of the other Parts.

BESIDES, some Wounds, though penetrating into the Cavity of the *Abdomen*, are nevertheless very simple, such as those that are occasioned by some Thrusts with a Sword, and by some Balls that have been known to pass through the Body without occasioning any sad Accident. I have

frequently heard it affirmed by the most expert Surgeons of this City, and I was a Witness of such Wounds about eight or nine Years ago, being one of the Surgeons on Board the *Count of Toulouse*, a Privateer, commanded by Mr. *de la Hunaudiere Nouail*. We had in an Engagement with an *English* Ship a considerable Number of wounded Men, among whom many Seamen received several Balls through the Belly and Breast; and in less than three Weeks, they were cured without any Accident, by Mr. *de la Motte Banos*, Surgeon-Major, under whom I was.

IF all the Wounds of the *Abdomen* were as lucky as those just now mentioned, Men would not be so frequently exposed to the Hazard of losing their Lives, or suffering great Indispositions: But we know by a great Number of Observations, that most Wounds penetrating into the *Abdomen* are attended with Symptoms generally occasion'd by the Wound of some *Viscus* contained in that Cavity, or by an Extravasation of Blood or Matter.

ANATOMY, confirm'd by daily Experience, shews that penetrating Wounds of the Breast with an Effusion, may be cured by a counter-opening, which we call the Operation of the *Empyema*; because the Blood or *Pus*, remaining upon the Diaphragm, may be evacuated by that counter-opening. It is not so in the *Abdomen*; and the most celebrated Practitioners have not yet informed us, that they have found out the way of extracting, by a counter-opening, the Blood or *Pus* lying in that Cavity: And considering the different Structure of that Capacity, and the difinal Symptoms

Symptoms attending those Wounds, a Surgeon must needs form a very doubtful Prognostick of them ; because generally about the seventh or eighth Day, and sometimes sooner, they are attended with a Fever, an Inflammation, intolerable Pains, Convulsions, a *Delirium*, and many other sad Accidents, which most times end only with the Life.

THOSE Accidents, though very dismal, are not the only ones, that happen in the Wounds of the *Abdomen* : All the *Viscera* contained in it may be hurt by the Instrument, which is the Cause of that Division ; and according to the Part that is hurt, the Surgeon ought to draw his Inductions, either for his Prognostick, or to make his Report to the Judges, or to take a right Method for the dressing of the Wound.

WHEN some of the floating Parts of the *Abdomen* do not come out through the Wound, the Probe shews whether it penetrates ; and by examining the Instrument, which made the Wound, either from the Account of the wounded Person, or of those that were present, or by the Sight of it, one may judge of the Nature of the Wound by Anticipation.

THE anatomical Divisions of the *Abdomen* into Regions, discover to us very nearly the different Parts contained under each particular Region : But in order to prognosticate more safely, the Patient must further be asked, what Situation or Attitude he was in, when he receiv'd the Wound.

THE different Sections made by Mr. *Duvernay* upon the *Abdomen* of several Persons, either in a perpendicular or oblique Situation, have shewn us demonstratively, that the greatest part of the *Viscera*

of the *Abdomen* altered their Situation in those different Attitudes. Mr. *Winslow*, Doctor-Regent of the Faculty of Physick at *Paris*, and a famous Anatomist of the *Royal Academy of Sciences*, has shewn us, as it were palpably, how much the Liver reaches beyond the false Ribs in a perpendicular Situation, especially when a Man has been a long time without eating; and that this *Viscus* being no longer supported by the Intestins, comes down so low, that carrying the Diaphragm along with it, the Vulgar says upon that Occasion, that *their Stomach draws*. Mr. *Lapeyronie*, Counsellor, first Surgeon to the King, admitted by Reversion, and Demonstrator of Anatomy and Surgery in the Royal Garden, made an Observation in a publick Lecture of Anatomy, which undeniably confirms what I have just now said.

AN Officer, said he, being wounded with a Sword about two Inches below the false Ribs on the right Side, was dressed, as if it had been a simple Wound; because there appeared no Accident. But eight Days after such dismal Symptoms follow'd, that the Patient died. His Body was opened; and it appeared that the Thrust had pierced the Liver, and that an Abscess had been formed in its Substance, which bursting, and running into the Capacity of the *Abdomen*, occasion'd the Accidents just now mentioned, and the Death of the Person.

HAD the Surgeon considered that the Officer stood upon his guard, and that in such a Situation the Liver might have been wounded, he would perhaps have cured him by a copious Phlebotomy, and by prescribing Vulneraries, and a strict Diet.

Mr.

Mr. *Lapeyronie* told me, that he cured such a wounded Man by a copious and frequent Phlebotomy, and by allowing him no other Food but Chicken-Broth.

BECAUSE a prudent and well-experienced Surgeon should prognosticate right; and because the Knowledge of the Parts contained in the *Abdomen* is of great use for their Cure; I think one cannot insist too much upon the Accidents attending the Wounds of those Parts, since every particular Sign is very equivocal, and something more certain may be inferred from many of them together.

I have just now said that from the different Regions distinguished in the *Abdomen*, and from the different Situations and Attitudes of the wounded Person, one might conjecture what Part may be hurt; yet to be more fully convinced of it, one must further examine the particular Accidents, which happen in the Wound of each Part. This I shall endeavour to explain with as much Clearness as I can.

WE know that a Wound, though penetrating into the Capacity of the *Abdomen*, does not affect any of the Parts contained in it, when the wounded Person feels only an outward Pain in his Wound, when hardly any Blood comes out of it, when no vomiting happens, when the Patient voids no Blood at the Mouth, nor by the Fundament, or Urine, and when the Belly is neither distended nor swell'd: In such a Case, one may very reasonably hope that the Wound may easily be cured, as I have already said.

THERE is ground to believe that the Diaphragm is affected, when the Blow is not far from the Re-

gion of that Muscle, when it is directed towards it, when the Patient can hardly breath, when he has got the Hiccock, and feels a great and deep Pain in his Wound. The Prognostick of that Wound is very dangerous, and 'tis but seldom that a Patient recovers; for that Muscle being inflamed, the Inspiration and Expiration are so constrained, that he must infallibly die. Besides, the Blood which continually comes out of that Wound, falling into the Capacity of the *Abdomen*, ferments, is converted into *Pus*, and occasions a Fever, an Inflammation, a Gangrene, and all the Accidents above-mentioned.

IF the Wound penetrates into the nervous Center of the Diaphragm, the Pain will be most violent; because the tendinous Parts are very susceptible of a Vibration. If the Pain is more acute in the nervous Center of the Diaphragm than in its fleshy Body, the Spirits must needs run into it in greater plenty, the Inflammation must be more considerable, the Fever more violent, and attended with a *Delirium*, and Death.

IF the Wound reaches only the Circumference of that Muscle, and does not penetrate into the *Abdomen*, nor into the *Thorax*, it is well known that there will be no Effusion in those Capacities, and that the Division being only in fleshy Fibers, which move more easily, by reason of their pliability, than the Fibers of the middle of that Muscle, which are harder and more stiff, it follows from thence that this Wound will not prove very dangerous, and may be re-united without any great Difficulty.

THE Wound of the Stomach will be known to the Surgeon, when it lies in the Region of that *Viscus*, or is directed towards it. A prudent Surgeon should also enquire, whether the wounded Person had eat any thing before he received the Blow; for the fuller the Stomach is, the more room it takes up, the lower it comes down, and is consequently more exposed to the Instruments, that may reach the Cavity of the Belly.

BESIDES, the Patient feels a great Pain in that Part; he is troubled with a frequent Hiccock; he vomits continually; and if the Instrument, which is the Cause of all those Disorders, has penetrated into the Cavity of the Stomach, besides all the Accidents just now mentioned, the sick Person will vomit Blood; the Aliments will come out through the Wound undigested; an Inflammation will happen in the *Abdomen*, and all the Accidents, depending upon this sad Symptom, will crowd in. From whence it may be inferred, that the Patient will not live long.

BUT if the Wound does only open the first Coats of the Ventricle, or if it penetrates into its Cavity, and is very small, one may hope to cure the Patient with a very strict Course of Diet, frequent Phlebotomy, &c. to stop the Vomiting, to moderate the intense Heat of that Part, and abate the violent Pain of it.

THE Wounds of the Intestines are known by a Tension of the *Abdomen*, and a great Pain in the Part it self: The Blood and the chylous Matters are ejected through the Wound, if the small Intestins are opened, or the Excrements, if the large ones be wounded: Besides the Patient voids Blood thro' the Fundament.

THE Prognostick of the Wounds of the Intestins is much the same as that of the Stomach ; but the Prognostick of the small Intestins is more dangerous than that of the large ones ; because the former are less fleshy, and more floating in the Belly, without being fixed in any place. Besides, the continual Loss of the Chyle does quickly throw the Patient into a Weakness, which makes him die of Inanition. But the large Intestins adhering most of them to the internal Surface of the Belly, the stercoral Matters may come out through the Wound without any Extravasation, especially if it lies in the hinder part of the Body, and it may be cured by healing up to a Scar, or by making a new *Anus* in that place ; of which we have some Instances.

IT is very difficult to know the Wounds of the Mesentery ; and we can guess at them only by the Depth of the Wound, and the good Condition the other Parts are in. If the Wounds of that Part do not divide any Vessels, they may be cured ; but if they happen to be in the Glands, wherein the lacteal Veins are re-united, they are very dangerous ; for those Veins being opened, the Chyle or the Lymph contained in them will fall into the Cavity of the *Abdomen*, and occasion a chylous Dropsy : Or if those Liquors ferment, they will corrupt, irritate the Intestins, and bring upon them an Inflammation, which will quickly be attended with a Gangrene. Besides, the Blood receiving no longer as much Chyle as it used to have, will not be able to repair the continual Losses it sustains by running through so many different Parts, and consequently the Patient will die of Inanition.

THE Surgeon knows that the Liver is wounded, by the different Situations and Attitudes the Patient was in, when he received the Blow, as I have already said, and likewise by the Probe, the Direction of the Blow, and the Pain felt in the Region of that *Viscus*. Those Signs, though equivocal, being put together, may give us some reason to believe that the Liver is wounded.

THE Wounds of the Liver are very dangerous, and those which happen in its concave Part are much more so, than those which affect the convex Part ; because in the first Case, the Blood that comes out in great plenty, and the Abscess which commonly follows, must fall into the Cavity of the Belly, where they occasion all the Accidents, which I have already so often mention'd. Whereas, when the Wound is in the convex Part of the Liver, the Blood may come out through the Wound, and one may give an Issue to the purulent Matter by opening the Abscess. I may add, that an Abscess in the concave Part of that *Viscus* is generally mortal ; because the Bile diffusing it self with the Blood, occasions a slow Fermentation, which is attended with a very copious Suppuration, and a total Destruction of the Liver, which ends in Death.

IT is extremely difficult to know the Wounds of the Spleen and *Pancreas*, and the Signs of them are only mere Conjectures, such as the Direction of the Blow towards those Parts, Vomiting, and a Fever. Those Wounds are very dangerous, by reason of the Humour they filtrate, which falls into the Belly. I add, that if the Spleen was destroy'd by an Abscess, or any other way, the Animal

mal would die afterwards of an Abscess, that would take up the whole Substance of the Liver; which may be explained by the Structure of the Spleen, and the Uses that are ascribed to it. But because this concerns Anatomy rather than Operations, I shall say nothing of it here.

THE Wounds of the Kidneys are known by the Place, and Direction of the Blow, by the Seat of the Pain, and the Blood voided by Urine. If the Wound lies in the hinder Part, and does not penetrate very deep into the Substance of the Kidneys, it may be cured; but if it reaches as far as the *Pelvis*, it is a very dangerous, and even mortal Prognostick; because the Urine coming out through the Wound, falls into the Cavity of the Belly, and occasions there an Inflammation attended with a Gangrene and Putrefaction.

THE Wounds of the Ureters are known by the Place, and Direction of the Blow, by the Seat of the Pain, and a little Blood voided together with the Urine. These Wounds are as dangerous as those of the Kidneys.

WE know the Wounds of the Bladder by the Situation and Direction of the Blow, by the Pain felt in that Place, by the Urine tinged with Blood, and a great Difficulty of voiding it.

THOSE Wounds are more or less dangerous, according to the Place they happen to be in; for if the Bladder is opened in its Bottom towards the hinder Part, the Wound is mortal, and likewise in all the places where the Urine may fall into the Belly. But when the Wound lies in a place of the Bladder, which the Urine does not commonly touch, it is not so mortal as some imagine; and
to

to prove this Truth by Experience, Mr. *Petit* affirms, that an Officer having been shot with a Gun in that Part, he was cut for the Stone seventeen Years after; because the Operator thought he had felt a Stone with the *Catheter*; but he was very much surprized, when he extracted a Ball cover'd with a little Tartar.

Mr. *Mery*, sworn Surgeon of *Paris*, first Surgeon of the *Hotel-Dieu*, and Member of the *Royal Academy of Sciences* has frequently pierced the Bladder with the *Trois-quart*, to bring the Urine out of it; which is a further Proof that the Wounds in some Places of that Part, are not mortal.

THERE is some ground to judge that the Womb is wounded, from the Situation of the Wound of the Teguments, from the Direction of the Blow, from the great Pain felt in that Part, and from the Blood that comes out through the natural Openings, when the Wound penetrates into the Cavity of the Womb. The prognostick of those Wounds is always very dangerous: However it is not altogether so dismal as the Moderns would have it. Wounds of the Womb of all sorts, and Abscesses, have been cured, contrary to the Expectation of those who tended the Patients.

LASTLY, the Surgeon suspects that some of the large Vessels of the *Abdomen* are opened, from the Quantity of Blood that comes out thro' the Wound, and from the sudden Tension of the whole *Abdomen*. Those Wounds are very dismal, and seldom afford sufficient time to examine them, because the wounded Persons die immediately.

THE

THE Direction of the Blow, as I have already said more than once, is one of the best Signs we have to judge of the Part that is affected; for a Thrust with a Sword may be given in the right *Hypochondrium*; and yet its Direction may be so oblique, that it does not reach the Liver, but the Stomach.

TO make an End of the prognosticks concerning the Wounds of the *Abdomen*, I shall say in general, that those Wounds which penetrate without hurting the internal Parts, are commonly cured without many Accidents, provided the Surgeon be not so imprudent as to search and irritate the Wound, together with the internal Parts, and to fill it with Lint.

WHEN the *Epiploon* comes out alone through the Wound, the Prognostick is not by a great deal so dangerous, as when the Intestin only comes out. And if the *Epiploon* and the Intestin come out together, the Disease is not so bad as when the latter comes out alone; because the *Epiploon* is a soft Body, which keeps the Intestin from being too much pressed, and makes its Reduction more easy.

WHEN the Intestin comes out through the Wound, there are certain Signs whereby one may know whether it be wounded, or not. First, when it is not at all distended. Secondly, when the Surgeon draws it a little out of the Belly, and it does not swell. Thirdly, when being reduced, it smells like the Excrements. In these Cases, there is ground to believe that the Intestin is wounded. But because the different Wounds of the Intestins are more or less dangerous, a prudent Surgeon

Surgeon ought to examine them well, that he may find out some curative Indications. Here follows what Mr. Petit says of them. *If the Wound of the Intestin be transverse, no other Fibers but the longitudinal are cut, and the circular remain intire. If it be longitudinal, the circular Fibers are cut, and the longitudinal remain untouch'd. But if the Wound of the Intestin be oblique, both Plans of Fibers are cut, and that Wound is the most dangerous, because it remains always gaping, and consequently less disposed to a Re-union.*

IN order to perform the Operation of the *Gastrorhaphy*, we must suppose complicated Wounds, which absolutely require such a Help. There are three Sorts of them. The first, when the Wound of the *Abdomen* is very large, with an Effusion in the Capacity, and an Issue of the parts contained in it. The second, when the Intestin is partly or totally cut, and consequently does not come out through the Wound, because being pricked, it does not roll so easily; or if it comes out, one may know it presently, because it is generally very flaccid. Lastly, the third sort of complicated Wound is when the Intestin or the *Epiploon* comes out through the Division, and even both of them together, the first swelled, and the other corrupted, and when all those Accidents are attended with a Constriction of the Skin.

BEFORE I proceed further, I must observe that though I instance in a distended Intestin, yet that Symptom does not happen as soon as the Intestin comes out, and that it swells only some time after, because some matters get into it by
Degrees,

Degrees, which not being able to come out again through the other End, by reason of the Constriction, ferment and occasion the swelling of the Intestin. That Swelling is further increased by an Inflammation proceeding from the Blood of the Veins, which stops there, and not being able to follow its usual Course, must needs ferment, and thereby occasion a considerable Tension in the Intestin.

THE Benefit to be reaped from this Knowledge is, that though the Intestin appears at first flabby; yet one must not infer from thence that it is wounded; for we make a great Difference between *flabby* and *flaccid*. The Sight, and an exact Perquisition, will clear those Doubts.

THE Operation of the *Gastrorhaphy* is proper for those three sorts of Wounds: But because Repetitions are tedious, I shall explain here the Difficulties attending each particular Wound, and describe exactly the Method of performing the *Gastrorhaphy*, when I have discoursed of the third Wound, which is one of the most complicated, and the most proper to give us all the necessary Light into this Matter.

IF therefore a Thrust with a Knife, a Bayonet, or some other like Instrument, should occasion a Wound in the *Abdomen*; if the Intestin, the *E-piploon*, or both of them together, should come out; and if the Wound being recent, the Constriction should not be yet very considerable; the Surgeon must immediately warm a Piece of Linnen folded into three or four Folds, and cover with it the Parts that are come out, to preserve their natural Heat, and prevent the Impression of the Air,
which

which is very prejudicial to them. At that very Moment, he must dip a Piece of Linnen in warm Water, and wrap up the Parts with it, after he has wiped off the Blood that may lye upon them: Or else, let him use an emollient Decoction, such as that of *Merels*, *Mallows*, and *Marsh-mallows*, laying aside all spirituous Liquors, because they contain coagulating Acids. Afterwards the Surgeon must reduce the Parts into the Belly; but before he makes that Reduction, which the Antients called *Taxis*, the Patient ought to be put in different Postures, according to the Situation of the Wound. If the Wound was above the Navel, the Patient's Breast should be more raised than the Belly: If it be lower than the Navel, something must be put under his Loins, that the hypogastrick Region may be higher than the epigastrick: Lastly, if the Wound be in one of the Sides of the Belly, the Patient must be turned on the opposite Side: All those different Situations are only of use to disentangle the Place of the Wound from the Parts of the *Abdomen*, that the Remainder of those Parts may not thrust against the Wound, and that the Reduction of those that are come out, may be more speedily and easily performed.

THE Surgeon must take care to cut the Nails of his two Fore-fingers, lest that should make a dangerous Impression upon the Intestin. He must lay the Fore-finger of one of his Hands above the Intestins, especially the End of the Finger towards the Place of the Intestin that came out last, and a little beyond the Constriction. Afterwards sliding it towards the Wound, and withdrawing it a little, he must thrust the Intestin till the Finger gets

gets into the Belly ; and then under that Finger he must convey the Fore-finger of the other Hand, with a small Portion of the Intestin, till he perceives that the first Finger may be removed, without any Danger that any other Parts should come out : So that the Surgeon must always have a Finger upon the Intestin to secure it ; and as he withdraws it, the other Finger must take its Place, till the whole Bundle of Intestins be reduced.

IF the Wound was in the Middle of the *Rectus*, and under the Navel, the Operator must take care, when he reduces the Intestin or the *Epiploon*, not to engage them between the Muscle and its Cover, which under the Navel is hardly adherent to the Muscle, there being generally no nervous Intersections in that Place. The Surgeon might then fancy, he has reduced the Parts into the Belly ; and those Parts being constrained between the Muscle and the internal Side of its Cover, would be attended with Inflammations, great Pains, Watching, a *Delirium*, a Fever, and perhaps Death it self. We are indebted to Mr. *Arnaud* for this Observation, which appears to me very important.

IF the *Epiploon* comes out with the Intestin, both of them ought to be reduced, beginning always with the Intestin, as being come out last ; but whilst the Surgeon reduces the Intestin into the Belly, a Servant must hold the *Epiploon*, that the Intestin may slide more easily. The Servant holding the *Epiploon* ought to do it with a great deal of Dexterity, for fear of bruising that fat Membrane, and occasioning in it an Inflammation, or a Mortification. The Intestin being reduced in the manner I have just now said, the same ought

to be done with the *Epiploon*, since we suppose that the Wound of the Tegument is recent, and that the *Epiploon* is not at all, or but little altered. Afterwards a Servant must hold the two Lips of the Division one against another, whilst the Operator makes himself ready to perform the *Gastrorhaphy*, which I shall describe at the End of my Account of that sort of Wounds.

THE Surgeon shall make a Fomentation upon the Belly with warm *Oleum rosatum*, applying upon it a Compress dipt in warm Wine, or in Water and Vinegar, the whole being supported by a Napkin and Scapulary. The Patient must lye upon the Wound to facilitate the Ejection of the Blood, or of the Matters extravasated in the Belly, if there are any. He must be blooded plentifully, to prevent a Fever, and other Accidents; and the Surgeon shall prescribe to him some Glisters, and a strict Course of diet.

THE second Wound to be cured, is when the Intestin is partly or totally cut.

THE Wound of the Intestin, in consequence of the Wounds of the Belly, is seldom cured, as it appears by the Experience of the learned Surgeons so often quoted by me. Those sorts of Divisions are, as I have already said, transverse, longitudinal, or oblique; and each of them is small, middling, or large, or the Intestin is altogether cut; and in this last Case, it seldom comes out through the Wound of the Teguments, unless it be very large.

IF the Wound be very small, which way soever the Fibers be cut, it is not necessary to make a Suture, and it may be cured without such an Operation. If the Wound be not too large, some

modern Surgeons advise to make a Stitch in the middle of it. That Practice ought not to be admitted; for every intersected Suture supposes a Knot after a Stitch, which would hinder the withdrawing of the Thread, when the Wound is cured, and occasion great Accidents, as I am going to shew. The Surgeon must therefore, in such a Case, especially when the Wound is very large, put into Practice the second Sort of Suture, which I have called the skinner's Suture. According to the usual Way of making that Suture, the Operator pierces the two Lips of the Wound transversely, and at once, and begins the second Stitch two Lines under the first, and on the same Side, fastening the End of the Thread under the second Stitch, to avoid making a Knot. Afterwards he continues to sow the Wound, and in the last Stitch he passes the Thread, or the Silk he makes use of, under the last Stitch, not to make a Knot. That Method of stitching the Wound always in the same Side, is the Reason why that Suture has been called the Skinner's Suture.

ALL Authors, both ancient and modern, are agreed that after a certain time the Surgeon ought to draw the Thread, with which the Wound of the Intestins has been sutured, without disordering the Wound of the Belly. But I ask whether that Thread can be drawn out of the Wound, when it is engaged in the two Extremities of the Suture, under circular Turnings with the same Thread continued, and what Disorder will not happen upon such an Endeavour. There is no Need of mechanical Proofs to condemn that Method, every body may easily judge of it.

OTHER Surgeons, who are more judicious, do not fasten the Thread at the Ends of the Suture; but, as all the Authors teach, they pierce transversely the two Lips of the Wound of the Intestin at once.

THE Surgeon cannot withdraw the Thread by one of the Angles of the Wound, after he has pierced the Intestin transversely, without straitening anew every Stitch, and contracting the Intestin; because the Turnings of the Thread, that are without, are oblique, and make acute Angles with those of the Inside, which describe transverse Lines.

NOT to say that according to this Method the Surgeon cannot withdraw the Thread, when the Wound is re-united, he occasions so great an Inflammation in the Intestin, by contracting it, that the Wound is quickly attended with an Inflammation and a Gangrene. In order to avoid all those Accidents, Mr. *Petit* makes that Suture in such a Manner that all the Turnings together are like a Line somewhat spiral, which has no Angle that can stop it, the Obliquity of the Thread being equally in the Inside and Outside of the Intestin. The Surgeon uses a flat and waxed Thread, and puts it into the Eye of a strait Needle, the Sides of which are cutting, of good Steel, and of a Bigness suitable to the Thread. Afterwards a Servant holds one of the Angles of the Wound, and the Surgeon holds the other with his left Hand, whilst with his right he conveys the Point of the Needle obliquely from without inwards, one Line above the Division: He pierces obliquely a Lip of the Wound, and then the second Lip

likewise obliquely one Line under the first, and from within outwards, that he may repeat the same, in order to make an End a little below the Wound.

By this Obliquity the Thread describes almost a strait Line, or one that is but very little spiral, and it may easily be drawn. The Surgeon must also leave the Thread long enough at both Extremities of the Wound of the Intestin, that he may apply it in its whole Length to the Wound of the *Peritonæum*, to facilitate the Re-union of it, being persuaded that it cannot be made without agglutinating it self to some adjacent Part: And he places the two Threads at the two Angles of the Wound of the Belly, to perform the *Gastrorrhaphy*; and then he draws the two Threads, to bring them more exactly near the *Peritonæum*, and he dresses that Wound as the foregoing.

THE Success of this Operation is very uncertain, as I have already said; and therefore the Surgeon ought to make a very doubtful Prognostick; he must blood the Patient, nourish him every Day only with three or four Yolks of new laid Eggs, and at the End of three or four Days allow him a small Quantity of Broth, and Jellies. The Patient must take nourishing Glisters: This Expedient ought not to be rejected, since Anatomy discovers to us lacteal Veins, which arise from the large Intestins, especially from the *Colon*. Those Veins can therefore take up the most subtil Particles of Glisters, and by that Means nourish the Patient for some time.

THIS Argument, grounded upon the Structure of the Parts, is further confirmed by Experience.

We

WE have seen in the *Hotel-Dieu* at *Paris* a Woman, who not being able to take any Nourishment through the Mouth, because she had been shot in the Jaw with a Fire-arm, yet recovered, having only taken nourishing Glisters for a fortnight. Since that time I have seen in that Hospital several Persons nourished in the same Manner.

IF on the fifth or sixth Day, the Thread grows loose, and the Patient feels some small Colick-Pains, 'tis a Sign that the Suture of the Intestine becomes an extraneous Body, and that 'tis time to take it off. In order to do it safely, the Surgeon cuts one of the Threads at one of the Angles of the external Wound, and laying his fore and middle Fingers on both Sides of the other End of the Thread, he draws it gently, leaving still one or two Days the other Threads, if there are any, in the *Epiploon*.

MR. *Arnaud* does ingenuously confess that he never saw any Case of this Nature, wherein the Surgeon was obliged to make the Suture of the Intestine. I saw it made once, in the *Hopital de la Charite* at *Paris*, upon a Chair-man, who had been wounded with a Knife in the Belly. Mr. *Guerin*, sworn Surgeon of *Paris*, and Master Surgeon of the *Hopital de la Charite*, performed the Operation; but the Patient died on the third Day. If the Intestine be altogether cut, the Surgeon must secure the End of it, which comes from the Stomach, being persuaded that Death is near at Hand, if the stercoral Matters fall into the Cavity of the *Abdomen*. He may distinguish that End of the Intestine from the other, by the Mat-

ters, which continually come out of it; and when he knows it, he must, if possible, make a Ligature at the other End, and put it into the Belly, letting however the Thread, (which ought to be waxed,) come out through the lower Part of the Wound. As for the Extremity continuous to the Ventricle, it must be fastened in the Circumference of the Division of the Belly with several Stitches of an intersected Suture; which is performed by piercing with a Needle the Intestin and the Teguments at the same time, and by that Means a new *Anus* is made. The Surgeon makes the Knots of the Stitches in the Outside of the Wound, and with the necessary Caution. He puts into that new *Anus* a soft Tent, covered with some spirituous Balsam, and tied with a Thread, lest it should go into the Intestin, and over it a Plaget, &c.

IF the Surgeon perceives never so little, that this Tent occasions some dangerous Accidents, he ought to take it out: The faecal Matters, continually running through the Wound, hinder it from being re-united.

THE modern Books justify the Practice of a new *Anus* by an Experiment made at the *Invalides* upon a Soldier; and besides that the Ancients afford us many Instances of that Practice, Reason cannot be against it, since it is the only Way of preserving the Patient's Life.

LASTLY, to put an End to our Reflections concerning the Wounds of the *Abdomen*, I shall in the next Place discourse of the third Sort of complicated Wounds, which I have mentioned above. In those Wounds the Intestin and *Epiploon* come out, the former very much swelled, and the latter

latter corrupted ; and all those Accidents are attended with a Constriction in the Skin.

WHEN the Surgeon is sent for to attend a wounded Person in such a sad Condition, he must, before he attempts any Operation, apply some Remedies that will mollify the Intestin, and abate its Inflammation. The Surgeon shall make a Fomentation with emollient Herbs, warmed with proper Oils, as those of Fennel and *Aniseeds*.

HAVING bathed and fomented the Intestin with those or other like Remedies, according to his Experience, he must handle it a little to remove the Winds, that may be contained in it. Some Surgeons, and *Ambrose Pareus* among others, would have the Intestin to be pricked with a Needle ; and some say, it must be round, for fear of cutting the Fibers of that Pipe, as a sharp Needle would do. This Dispute is of small Importance, and hardly deserves to be confuted or approved.

IT may be said in general, that things ought never to be brought to this Extremity, but when there is a great Bulk of Intestins come out, and when they are so full of Wind that they cannot be reduced, even after having sufficiently dilated the Wound of the Teguments, and tried all the Means, which Art and Skill can invent for that Purpose. In such a Case, it is better to prick them, than to suffer the Patient to die ; which would reflect very much upon the Surgeon. But then he ought to take his Measures so well, and conceal his Instrument so dexterously, that the standers by may not perceive it.

IF the first Method proves useless, and does not quickly facilitate the Reduction of the Intestin, the

Surgeon must dilate the Wound of the Belly. In order to make that Operation, he must cut the Skin, the Fat, the Muscles, their Membranes, and the *Peritonæum*, because the Constriction is in those Parts. But as the first Obstacle is to be found in the Skin, and we know by opening the dead Bodies of those, who had a Wound in the *Abdomen*, that 'tis extremely difficult to reunite the *Peritonæum*, this Part ought to be used with the greatest Caution, and the Surgeon must cut a greater Quantity of the external Teguments, which may more easily be re-united, especially the Skin and the Fat. By this careful Method, the Operator will perhaps prevent the Ruptures of the Belly, which are commonly a Consequence of that Disease, and frequently occasion the Death of the Patient.

BEFORE the Surgeon proceeds to this Operation, he must prepare the Instruments proper for it, the first of which is a hollow Probe, stopped at the End. Its Groove ought to be proportioned to the Bigness of the Instrument, that must slide in it; for otherwise the Surgeon would run the Hazard of miscarrying in the Operation. The second Instrument is a crooked *Bistouri*, the Point whereof should be somewhat blunt, and its Blade made fast with a Fillet.

AFTERWARDS the Operator must look for a Place in the Wound, that is the most proper to make a Dilatation; and it must be, as much as possible, in the Angles of the Wound, especially on that Side where the Intestin inclines least, avoiding the *Linea alba*, and the Course of the umbilical Vein, if the Surgeon be near it. For some Operators have been very much surprized to see, in
such

such a Case, the Blood gushing out from that Vein : Wherefore if the Wound be above the Navel, the Dilatation ought to be made underneath ; on the contrary, if it be underneath, it must be made above the Navel.

ALL these Circumstances being duly observ'd, the Surgeon wraps up the Parts, that are come out, in a Rag dipt in warm Water ; and then, by means of the Intestin, which he keeps steady with his left-Hand, he endeavours with his right to introduce the grooved Probe.

THE Surgeon drives the Probe rather over the Intestin than over the *Epiploon*. The former, if compared with the other, being a steady and solid Body, does very much facilitate the Introduction of that Instrument. On the contrary, the latter being a tender and flabby Part, not only yields to the Probe, but also is apt to tear off, and renders the Wound more complicated, and the Operation more difficult,

WHEN the Surgeon is so lucky as to introduce the Probe in this manner, he must convey it near the internal Coat of the *Peritonæum*, moving it a little on the right and left, to see whether it touches it immediately, and whether there be not any thing between ; which the Operator may know, when he feels a smooth Body, which makes some Resistance.

AFTERWARDS the Surgeon takes the Probe with the left Hand, and the *Bistouri* with the right, which he holds like a writing Pen, and conveys it into the Groove of the Probe, nearer the left Hand than the Parts he designs to cut, sliding the Back and Point of that Instrument all along the Groove
of

of the Probe, which he must keep steady, the left Hand being without Motion in that first Cutting, which shall be made with the Edge of the *Bistouri* to unbridle the *Peritonæum* and the Membranes. Without quitting the Instruments, the left Hand which was at rest, shall be in motion, and the other shall hold the Point of the *Bistouri* in the Groove of the Probe, without stirring, whilst the Surgeon raises the Point of the Probe, to cut the Constriction of the Skin with the Edge of the *Bistouri*.

BUT if the Constriction be so considerable that 'tis impossible to convey the Probe into the Belly, the Surgeon must use a small Stilet with a Button at the End of it, and with the Help of the Stilet he shall convey the Probe to do what I have just now described; or if the Stilet cannot easily get in, he must apply the fore-Finger of the left Hand upon the Intestin, to remove it from the Constriction, as much as he can, cutting the Skin upon the Nail of his Finger with the Point of a crooked *Bistour*. The Operator having loosen'd the Skin by means of that small Opening, moves his Finger forwards, and cuts part of the Muscles and Skin at several times, till he makes in the external Teguments a sufficient Opening to introduce a Probe, in order to dilate the *Peritonæum*.

SINCE the Surgeon ought to use the *Peritonæum* more cautiously than the Skin, I would advise him to cut the Teguments, and the *Peritonæum*, (the Probe being in the Belly) in the same manner as he cuts them upon the Nail; because he sees what he cuts, and can make as great a Division as he thinks fit, especially in the *Peritonæum* and the Skin.

WE are indebted to Mr. *Petit* for a new Method of dilating the Constriction, and it is preferable to all others, as being quicker and safer. It consists in having a small strait *Bistouri* with a blunt Edge, and a Button at the End of it.

THE Excellency of that Instrument appears by its dilating the Wound without so much ado; because it may be plunged into the Belly, without piercing or cutting the Parts contained in it. However, it cuts sufficiently to divide those that are distended and stretched, and which make some Resistance, such as the *Peritonæum*, the Membranes of the Muscles, and the Skin.

THE Operator having dilated the Wound, and removed the Obstacle, that prevented the Reduction of the Parts into the Belly, must reduce the Intestine in the manner above-mentioned, whilst the Servant holds the *Epiploon*. Afterwards he makes him hold the two Lips of the Wound brought near one another, that the Intestine may not come out again, and considers whether the *Epiploon* be gangrened and rotten. If it be only somewhat blackish and livid, it must be reduced: The natural Heat of the *Viscera* will restore, if I may say so, the Life it seemed to have lost. Some good Practitioners have reduced a great part of the *Epiploon*, which appeared blackish and livid; and the Patients recover'd, without any Accident arising from thence. Those Surgeons took that Course, being persuaded that the *Epiploon*, when tied, did suppurate, and that the Matter falling upon the Intestines, and consequently into the Belly, occasioned such sad Accidents as were quickly attended with Death.

THE Suppuration of the *Epiploon* is yet more encreased, upon another account ; because Surgeons generally make the Ligature in the sound Part ; and after they have reduc'd it, not only the dead Part suppurates, but also the sound one contained under the Ligature : Which would not have happen'd, if that fat Membrane had been reduced, without making a Ligature in it ; and no other Part but the dead one at most would have suppurated. Wherefore, if a Suppuration cannot be avoided, it is as well to reduce the altered *Epiploon*, as to tie it.

Lastly, if notwithstanding all these Arguments, a Surgeon resolves upon the Ligature, there are two ways of making it : The first, when there is but a small Part of the *Epiploon* to be taken off, and consequently the Part, that is tied, cannot be very considerable. In this Case, the Operator makes a Servant hold the Extremity of that Membrane, and then ties with a Fillet such a Part of the *Epiploon* as he thinks fit, making the *Surgeon's Knot*, that is, a double Knot ; because in order to make it, he passes the Thread twice into the Loop ; and above that Knot he makes a single one, that he may the better stop the first.

If we make at first a double Knot, 'tis in order to prevent the loosening of the Fillet, whilst the second Knot is making : And if it be said, that the double Knot is not so binding as the single one, we answer, that it would be a Fault to straiten it so exactly, since by that means one would run the Hazard of cutting that fat Membrane, which makes no great Resistance ; and the Ligature is sufficiently straitened, when it stops the
Blood.

Blood. Afterwards the Surgeon cuts the Thread at the length of half a Foot, and the *Epiploon* about an Inch on this side of the Ligature.

THE second way of making that Ligature, is when a great Part of the *Epiploon* must be cut, and when the Surgeon foresees that the Part tied will be very bulky. In such a Case, he stretches the *Epiploon*, and examines through the light the place in which there are fewer Vessels. Afterwards he passes through the *Epiploon* a Needle with another like Thread. He takes away the Needle, and ties the *Epiploon* on one side with a single Knot, and then makes a Turning with the Thread in its Circumference, and one Line above the half Turning, which he stops with two single Knots. Lastly, he cuts the Thread at the Length of half a Foot, and then the *Epiploon* about an Inch on this side of the Ligature.

IF the Surgeon makes only single Knots in this Case, it is because there is a greater part of the *Omentum*, and because the second Knots are made in the side opposite to the first.

I must observe that I make but one Turning with the Fillet in the first sort of Ligature, and one and a half in this, to avoid making too great a Bulk, like those who make three or four Turnings; which must needs be attended with bad Consequences, and too plentiful a Suppuration.

THE Ligature being made, the Operator conveys the *Epiploon* into the Belly, and places the Fillet in one of the Angles of the Wound, to perform the *Gastrorhaphy*; and to succeed in it, he must practise every thing the Art of SURGERY affords, to overcome all the Difficulties.

THE Surgeon shall have Needles of good Steel, sharp-pointed, and cutting, that he may easily pierce the Skin, which is very close and hard in the *Abdomen*, and consequently, as Mr. *Duverney* rightly observes, more difficult to pierce in that Part than in all the others.

THE Figure of the Needles must not be like a Bow, as is described in all ancient and modern Books; because the Surgeon could not support their Heads upon the Ball of the Thumb, and at the same time conceal the Point with the End of the fore-Finger. Their true Figure therefore ought to be this; they must be strait, the two third Parts of their Length, and the Remainder, as far as the Point, must be crooked.

BECAUSE the Skin makes a great Resistance to the Needle, and the Surgeon might hurt that Part of his Hands on which the Needle's Head lies, he must use a small Port-Needle, or rather Mr. *Petit's* Ring above described. He may put it on his Fingers, or Thumb, and it is very convenient to perform that Operation.

THE Surgeon shall pass a Fillet, made up of eight or ten Threads, into the Eye of two Needles, one at the End of each Fillet: Afterwards he shall convey the fore-Finger of his left-Hand upon that Lip of the Wound, which is farthest from him, that he may turn up the *Peritonæum* and the Teguments; and drawing the *Peritonæum* with his fore-finger, he shall push back the Teguments with his Thumb.

IN the next place, the Operator shall take one of the Needles with his right-Hand, its Head resting upon the Ball of the Thumb, and lying along
the

the Inside of the fore-Finger, the Thumb holding it, and its Point being concealed by the fore-Finger, for fear of hurting the Intestins by conveying it into the Belly : But because the Skin cannot be easily pierced, the Surgeon shall use the Ring ; but then the Needle must be somewhat short.

THE Surgeon conveys the Point of that Needle, which is concealed by the End of the fore-Finger of the right-Hand, under the Lip already made fast with the left-Hand : And because the fore-Fingers cross one another, which is a great Obstacle to the good Success of the Operation ; the Surgeon must bring his Elbows as near his Breast as he can, to avoid that Inconvenience. Afterwards he pierces with the Needle pretty deep into the Teguments ; because the continual Motion of the Belly might break the Suture ; and he pierces in the Middle of the Lip, if the Extent of the Wound requires but one Stitch ; and if the Surgeon is obliged to make two Stitches, he always begins with that place, through which the Intestine may more easily come out.

WITHOUT removing the fore-Finger of the left-Hand from the inside of the Wound, he conveys it under the Lip, that remains to be pierced, drawing the *Peritonæum* towards the Lip just before pierced ; and drawing the Teguments, he takes with the right-hand the Needle, which is at the other End of the Thread ; and instead of bringing the Elbows near the Breast, he must remove 'em from it, and pierce with the same Circumstances I have just now described.

MOST Authors tell us, that this Suture ought to be fastened with a Knot, and a Loop upon that
Lip,

Lip, which is less liable to discharge the Matters.

BUT if there be a Suture, that requires Quills, it is doubtless this, since it must be able to resist the continual Motion of the Wound, which lies in Muscles so necessary to Respiration. And by virtue of that great Motion, the Threads might tear the Lips of the Wound, if their Effort was not stopped by that Means.

THE Surgeon must therefore divide the Fillet into three, as it was done in the quilted Suture, and apply a Quill upon each Lip of the Wound, which ought to be fastened with a Knot, and a Loop made with two Threads of the Fillet. Afterwards he draws a little the Ligature of the *E-piploon*, and places it in one of the Angles of the Wound, to apply upon it a Plaget armed with *Ar-cæus's* Balsam; because it excites a gentle Suppuration, which is necessary in this Case; and the better to secure the Plaget, and the Suture, he makes a Knot, and a Loop upon the Plaget with the third Thread, left on each side of the Wound. He shall rub the Belly, and particularly the whole Circumference of the Wound, and the Navel, with *Oleum rosatum*, warmed with a little Brandy. He must lay upon those Parts a large Compress with the same Medicament, and over that another dipt in warm *Oxycrat*; the Whole being supported by a proper Bandage, as I am going to shew.

Of

*Of the Bandage known by the Name of
NAPKIN and SCAPULARY.*

THE Dressings of the *Abdomen* and Breast are generally supported by the Bandage called the *Napkin* and the *Scapulary*. It is a compounded Bandage; and in order to make it, the Surgeon takes a large Napkin, much longer than broad; he folds it into three, according to its Length, and then rolls it at the two Ends, to apply it more conveniently about the Body. He lays the Middle of it upon the *Apparatus*, and then carries it round the Body, holding the Rollers in his Hands, and puts one of the Ends under the other, to pin it where it ends.

THAT Napkin may grow loose, and come off from the *Apparatus*; and therefore the Surgeon keeps it on by the *Scapulary*, which is a Piece of Linnen, about six Inches broad, and above three Feet long for the Wounds of the *Abdomen*; but the Length of three Feet is sufficient for those of the Breast. He folds that Linnen into two, according to its Breadth, that he may know the Middle of it exactly: He makes a Slit in the Middle about five or six Inches long, according to the Length of the Linnen; and then he unfolds it to pass the Patient's Head through the Slit; and the Middle of the Linnen being upon the Shoulders, he pins upon the Napkin the Ends hanging before and behind.

MOST Surgeons are of opinion, that a Tent should be put into the lower Part of the Wound, to keep it always open, (say they) that the purulent

G

Matter

Matter proceeding from the tied *Epiploon* may easily come out. Some will have it to be very large and crooked, for fear it should hurt the Intestins, as they pretend. Others being sensible that a long and large Tent may be prejudicial, use only a small one.

As for me, I am of a very different Opinion; for I do altogether reject the Use of a Tent, looking upon it as being needless for several Reasons.

First, THOSE who make use of a Tent, do it to facilitate the coming out of the purulent Matter, by keeping asunder the lower part of the Wound. But since I have proved that Quills are absolutely necessary to support the Suture, it is easy to infer from thence, that the Lips of the Wound are at a sufficient Distance, to make way for the Matter. Therefore a Tent is useless.

Secondly, IF that Tent be introduced to help the Discharge of the Matter, far from having that Effect, it will stop the Passage. The Matter must therefore remain in the Wound from one Dressing to another; and supposing it might be taken out in dressing the Wound, yet during that Time, it will diffuse it self into the Cavity, together with the Intestins; it will ferment, and occasion an Inflammation, a Gangrene, and Death. Therefore a Tent is not only useless, but even pernicious.

Thirdly, THAT Tent must absolutely reach much farther than the *Peritonæum* to remain in the Wound; and therefore those who are for it, take care to sow the End of it, that it may not (say they) hurt the Intestins: But this will not hinder it from occasioning the Accidents just now mentioned; or else it should be pierced in the Middle. Besides, though

though it should not reach beyond the *Peritonæum* above one Line, yet it is a hard and uneven Body, which the Intestins cannot touch without being irritated, bruised, inflamed, &c. Therefore that Tent is very prejudicial.

Fourthly, IF a Surgeon, in Imitation of those who acknowledge part of these Inconveniencies, puts in only a small Tent of Lint, he may be sure that the epigastric Muscles, not being able to resist the Motions of Inspiration and Expiration, and the Intestins being always in peristaltic Undulations; I say, he may be sure that those *Viscera* will quickly repel it, and that it will not remain a quarter of an Hour in the Wound. Therefore it is useless.

I might alledge several other Reasons, to condemn the Use of the Tent. For instance, a Tent infiltrated with *Pus*, or other Matters, will make the Lips of the Wound livid, hard, and callous; and if the Salts of the *Pus* are coarse, they will irritate the Skin, and bring an *Erysipelas* upon it; which is such a dismal Accident, that it occasions the Death of the Patient, notwithstanding the great Care of the Surgeon.

THE best Situation for the Patient, after the Operation, is to lie upon his Wound, that the *Pus* may still come out, and the *Epiploon* more easily adhere to the *Peritonæum*.

THE Patient shall be confined to a very strict Course of Diet. A frequent Phlebotomy will ease him very much, and emollient and softening Glsters not only relax the Fibers, and dilute the Matters, but also refresh and calm the Motion of the Blood and Spirits, and prevent a Fever, which is

much to be feared. Gentle Vulneraries may also be used in the manner I have prescribed after the general Precepts relating to Wounds.

THE Wound must be dressed twice a-day, as I have just now shewed; and on the sixth or seventh Day, the Surgeon must give small Concussions to the Ligature of the *Epiploon*, taking care not to strain any Part; and when it is taken off, and the internal Suppuration is quite over, instead of *Arcaus's* Balsam, he shall use a spirituous and balsamic one, and shall not take off the Suture till the Wound be perfectly cured.

IF the *Epiploon* comes out alone after a Thrust with a Sword, or some other Instrument, and cannot be reduced by reason of the Smallness of the Wound, the Surgeon ought not to make a Dilation of that Wound, nor a Ligature of the *Epiploon*; but it will be much better to cut it level with the Skin, having first examined whether it contains some Circumvolution of an Intestine. Afterwards the Surgeon dresses the Wound with a Plaget dipt in a spirituous Balsam. Which has been practised by Mr. *Arnaud* with good Success.



CHAP. V.

Of Hernias.

A *Hernia* is a preternatural Tumor, which happens in the Circumference of the Belly, and is occasion'd by some solid Parts, or the settling of some Humours.

I shall treat in this Chapter, of those Tumors, that happen in the Circumference of the Belly, and are occasioned by the coming out of some of the floating Parts contained in it; and then I shall discourse of *Hernias* occasion'd by Humours, call'd by some *Spurious Hernias*, and more commonly known by the Names of *Hydrocele*, *Sarcocele*, &c.

THE Tumors of the Circumference of the Belly, occasion'd by some of its floating Parts, are called in general true *Hernias*; but each of them is distinguished by its proper Name, according to its Situation, and the Parts it contains.

BEING consider'd with respect to the Places they are in, they are called *inguinal* at the Groin; *crural* in the fore and upper part of the Thigh; *exomphalous* or *umbilical* in the Ring of the Navel; and those which happen in the other Parts of the *Abdomen*, are named *ventral*.

BESIDES those Sorts of *Hernias*, some are also to be seen in the Interval of the two *Recti*, viz. from the Navel to the *Xiphoid* Cartilage; and these frequently appear in Children. The others appear from the Navel to the *Pubes*, and are more common in those Persons, who have been considerably swelled, in Women who have born many Children, and those who are with Child.

Lastly, IN relation to the Place wherein they shew themselves, they are also called *complete* and *incomplete*. For instance, when they fall into the *Scrotum*, or into the Lips of the natural Parts of Women, they are called complete; and when they are confined to the Groin, *incomplete*; and both Sorts are either with or without Constriction;

or with an Adherence of the Parts that are come out, or without such an Adherence: But those two things are frequently to be seen together.

Hernias being consider'd with respect to the Parts contained in them, have also different Names. For instance, if the Intestin raises the Skin, in the Groin, that *Hernia* is called *Enterocoele*, from the Greek Words *έντερον*, which signifies an *Intestin*, and *κήλη*, a *Tumor*. If the Skin is raised by the *Epiploon*, it is called *Epiplocele*; and if the Tumor is made up of those two Parts, it is named *Enteropiplocele*, &c.

THOSE Tumors arise from the Parts, which fall from their natural Place into other Places.

AMONG those Parts, that can be displaced, the first to be found at the opening of the Belly, is the *Epiploon*, a fat Membrane, floating upon the Intestins; afterwards the Intestins, which seem to have no particular Limits: However, some of them are so strongly connected with the *Peritonæum*, that they can never leave their Place to form a *Hernia*.

THE Intestins, that form those Sorts of Tumors, are the *Jejunum*, the *Ilium*, the *Cæcum*, its *Appendix*, and the *Colon*. The *Mesentery* is frequently one of those Parts, and sometimes comprehended in the Tumor with the Intestins. Lastly, the Bladder is also a Part, that can form a *Hernia*, as I shall say afterwards.

THE Places, that make way for those different Parts, are the Rings of the Abdominal Muscles, the mechanical Structure whereof is very singular, and hinders those Parts from coming out: For the first Ring, reckoning from the Inside to the Outside,

side, is that of the transverse Muscle, which is not properly a Ring, as Anatomists describe it, and the Cord of the spermatic Vessels does not pass thro' its fleshy Fibers, but directly beneath the whole Muscle towards the *Iliac*, as Mr. *Petit* shew'd me several times. The second Ring is in the *Obliquus internus*, and in the fleshy Fibers of that Muscle: It is situated about one Inch lower than the other, and more towards the *Symphysis* of the *Pubes*. The third is in the *Obliquus externus*, below the former, and in the Aponurosis of that Muscle: So that those three Rings describe an oblique Course, going from the *Pubes* to the *Ilium*. It appears from hence, that the Author of Nature has so framed the Openings of those Muscles, that they are stopped by the Muscles themselves. However, in some Cases, they come so near one another, as I am going to shew, that they make way for the Parts; but those *Hernias* are not so frequent as the following.

THE second Place through which the floating Parts of the *Abdomen* come out, is the Sinuosity of the *Ilium*, on which the Tendons of the *Psoas* and *Iliac* Muscles, and the crural Vessels descend. That place is covered with a kind of Ligament, in the form of an Arch, made by the Aponurosis of the *Obliquus externus*, which is reflected inwardly, as Mr. *Duverney* says, to give Rise to the *Obliquus internus*; so that by this Folding the Arch makes a greater Resistance. It adheres to the fore and lower Spine of the *Ilium*, and proceeding from thence it adheres to the external Side of the Sinuosity of the *Pubes*, through which the spermatick Vessels pass. In that way, which is

about two Inches long, it leaves an oval Opening, which is only taken up, as I have just now said, with the Tendons of the *Psoas* and *Iliac* Muscles, and the crural Vessels, and is shut up in the Inside by the mere *Peritonæum*, and covered in the Outside only with the common Teguments, which are the Skin and the Fat.

I think this Description clearly shews how easily the Parts of the *Abdomen* can pass through the Opening, which is under the Arch of the crural Vessels; and this is one of the most frequent *Hernias*.

THOSE *Hernias* are not new: They frequently happen, especially to Women; because the Rings of the epigastric Muscles are smaller in them than in Men; and if they are not described in Books, 'tis because no Care was taken to examine in dead Bodies the different Places of the Belly, which make way for the Parts that form the *Hernia*.

THE third Place through which the floating Parts of the *Abdomen* come out, is the Ring of the Navel; because in that Place, the Production of the *Peritonæum* attending the umbilical Vessels, nothing remains but the internal Surface, which makes a lesser Resistance to the Parts.

IT is a little more difficult to understand the ventral *Hernias*; because there are no other manifest Openings, through which the Parts can come out; and because the Fibers of the epigastric Muscles crossing one another upon the Sides, hinder the coming out of the *Epiploon*, or Intestins; yet Experience teaches us that this happens sometimes: Learned Physicians and Surgeons have seen several Persons affected with it; and there was no Ground to ascribe it to any external Cause. IF

IF the Causes of *Hernias*, which we have looked for in those Parts of the *Abdomen*, that can be displaced, and in those Places through which they can come out, I say, if those Causes were not preceded by some violent Efforts, attended with a Relaxation of those Parts, Man would never be affected with those sad Diseases; since the Author of Nature made the *Viscera* loose and wandering for no other Reason, but that they might be tossed and thrown every way, in order to be always pressed by the Diaphragm and epigastrick Muscles, for a more perfect Digestion, and a more regular Distribution of the Chyle. The Author of Nature made a Passage in the *Abdomen* for no other Reason, but to let out those Parts that are absolutely necessary for the Propagation of the Species.

WHEN therefore any *Hernia* happens, there must be some concurring Causes, which attending the former, produce jointly all the Disorders of a *Hernia*.

THOSE Causes are either internal or external: The former act upon the Parts capable of being displaced, such as the *Peritonæum*, the *Epiploon*, the Intestins, &c. and are a superabundant Serosity proceeding from the Glands of the Intestins, and Groins, and from those of the *Peritonæum*, which moistening not only those Parts, but the Rings and Arches of the epigastric Muscles, do so relax their Texture, that they are forced to yield to the Impulse of the floating Parts.

ACCORDING to this Reasoning, People who inhabit marshy and moist Countries, and live upon Butter, Oil, and other fat and unctuous Aliments,
are

are much more liable to *Hernias* ; which is confirmed by Experience.

THE second Causes act upon the Parts, which occasion the *Hernia*, such as the Muscles of Respiration and of the *Abdomen*, and are violent Blows, great Concussions, Vomitings, long Running, Burdens, Dancing, Leaping, continual Crying, a violent Cough, an Excess in Venery, and generally all violent Exercises.

IN order to be informed of the Manner how the external Causes occasion a *Hernia*, one must know how the epigastric Muscles compress on all Sides the floating Parts of the *Abdomen*. First, the lower Fibers of the *Obliquus externus*, for instance, on the right Side of the Belly, with the upper ones of the *Obliquus internus* on the other Side, do jointly form Lines cutting the Belly obliquely : And if the same Application be made to the lower Fibers of the *Obliquus externus* on the left Side, and they be united with the upper ones of the *Obliquus internus* on the right Side ; it will appear by that wonderful Mechanism, that the Belly is cut obliquely every way, and consequently compressed in all the Parts of its Circumference. Secondly, Besides the Compression of the two oblique Muscles, the Fibers whereof cross one another, the transverse Muscle does also increase that Action by Fibers ending horizontally in the *Linea alba* ; and by that Mechanism the Compression is still more exact.

THERE are so many Circumstances to be mentioned, and so many Mechanisms to be taken Notice of in Relation to those Muscles, that a particular Account of them all would be too long ;
and

and because this belongs rather to Anatomy than to chirurgical Operations, my Design is only to shew the exact and equal Compression of the whole Circumference of the Belly.

To make a right Application of this Theory; if the Parts displaced are already relaxed, whatever be the Cause of it, and if at that Time a Man happens to make some considerable Effort, the Diaphragm being then violently contracted, as well as the Muscles of the *Abdomen*, the Intestins and the *Epiploon* will be so compressed on all Sides, that they must in a Manner be forced to get into those Places of the Circumference of the Belly, which are the weakest, the most easy to be forced, and make less Resistance.

It is not difficult to apprehend, that in the strong Contraction we suppose in the epigastric Muscles, their Openings will come near one another, and be so parallel, that they will make but one Passage in a strait Line, which not resisting sufficiently the Impulse of the Intestins, (the *Peritonæum* being simple in that Place) they will get into that Passage in the same Manner as Dough squeezed in the Hand, comes out through the Intervals of the Fingers, all the Muscles of the *Abdomen* being then strongly contracted. This happens the more easily, because the Vessels of the *Peritonæum* are constricted in that Place, the Lymph diffuses it self, and relaxes its Texture; which makes it yield the less Resistance, because that same Violence obstructs the Course of the Liquors in the Rings of the Muscles; and that Obstruction makes them still more pliant and yielding to the Impulse of the Intestins.

THE erect Posture of a Man does not a little contribute to those Diseases, since the natural Direction of the Intestins is to fall perpendicularly upon those Places of the Belly, which resist the least.

IF the Effort be not considerable, and the Parts about the Groin are not much relaxed, the Intestine or the *Epiploon*, being impelled through the Rings, will not go further than the Groin, and will occasion what we call a *Bubonocoele*. But if the Effort be very considerable, if the Skin and the Parts about the Groin are much relaxed, and if those that are come out, remain so a long Time, they will by Degrees descend into the *Scrotum*, and produce what we call a compleat *Hernia*.

AND because the Heat of the Matter contained in the Intestine, rarifies the Air, which does also get into it, the Intestine will swell, and compress its Blood-Vessels. That Compression obstructing the Circulation, there will happen an Inflammation in all the Parts contained in the *Scrotum*; which will facilitate the Adherence of the Intestine both to the Testicle and the Bag of the *Hernia*. The Inflammation, encreasing more and more, will affect the Ring of the *Obliquus externus*; and a Constriction will ensue, attended with sad Accidents, as I shall say by and by.

LASTLY, the Inflammation, being still more encreased, will heat to such a Degree the Matter contained in the Intestine, that it will ferment very much, and considerably distend its Coats; which will still increase the Irritations, the Pains, and the Constriction; and this last Accident obstructing the Return of the Blood, it will accumulate
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in the Coats of the Intestin so plentifully, that this Part will quickly be affected with a Gangrene.

IF the *Epiploon* is also fallen together with the Intestin, the Accidents will not indeed be so great at first; but the fat Membrane receiving continually some Blood from the Arteries, and the Return of that Liquid being stopped by reason of the Constriction, which begins, I say, that Membrane will relax it self more and more, and very much encrease its Bulk.

AND if all the Accidents just now mentioned happen in the Intestin, and if that Part of the *Epiploon* be encreased to a considerable Bulk, it will be so constrained, both on account of the Inflammation and Constriction, that it will afterwards be gangrened.

THE crural *Hernia* happens in the same Manner as that, which I have just now described, and even more easily, since the Obstacle is not so great on the Side of the Arch, as on the Side of the Rings of the epigastric Muscles; and therefore I shall say no more of it.

THE *Exomphalous* proceeds from the same Causes as all other *Hernias*; I mean, that the Hole of the Navel will relax it self, and grow larger as well as those of the Groin; and if at that Time one makes a great Effort, the Intestins being impelled downwards by the Diaphragm, compressed on all Sides by the epigastric Muscles, and besides meeting with some Resistance on the Side of the Groin, they will come out through the Hole of the Navel, whether a Woman's being with Child, or the Situation of the Intestins, force them thro' that

that Passage ; from whence different Accidents will ensue, according to the Greatness of the Disease.

THOSE *Hernias* frequently happen to Children, because a Tumor or an Inflammation is formed in the remaining Part of the Navel-string, when it has been cut off; which occasions an Effusion of Serosity upon the Hole, and relaxes its Texture, that Hole not being yet well shut up. I add, that Children crying continually, and lying frequently in a favourable Situation, the Intestins are chiefly impelled that Way.

WOMEN with Child are also much subject to those *Hernias*, because the Muscles of the *Abdomen* being much stretched, the umbilical Ring is forced to dilate it self: And the great Bulk of the Womb, compressing the Vessels of the *Peritonæum* and the Muscles, causes the Blood to stagnate there; which relaxes them, (the *Serum* being separated from them) and produces all the Kinds of *Hernias*, that happen, as I have said, in the Interval of the *Recti Adominis*.

IN order to explain the *Hernias* of the Belly, it is absolutely necessary to suppose that some Fibers of the transverse Muscle are wanting, whatever Accident may be the Cause of it, and that the Muscles being in that Place weaker, and making less Resistance to the Impulse of the Intestins, the latter moving by Degrees, will at last get into that defective Part of the transverse Muscle, divide the Fibers of the oblique Muscles, and raise the Skin. Thus the *Hernias* of the Belly will be formed.

I shall say nothing here of those *Hernias* of the Belly, which are a Consequence of Wounds:

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I have sufficiently enlarged upon that Subject, discoursing of the *Gastrorrhaphy*; and I have said that because the *Peritonæum* is seldom, or with great Difficulty re-united after a penetrating Wound, a *Hernia* does commonly attend such Wounds.

THE diagnostic Signs of those Diseases are equivocal; yet when many of them concur together, one may make a more certain Judgment, and know by what Part the Tumor is occasioned. I may further affirm, that some *Epiploceles* have been attended with such fatal Accidents, that a Surgeon, before the Operation, might mistake it for an *Enterocèle*.

THE Figure of the Tumor may serve as an Indication; for if it be even and smooth, if it has any Elasticity, and if the Impression of the Finger does not remain in it, there is good ground to believe, that 'tis a Portion of the Intestin, which begins already to swell.

IN such Circumstances, the Surgeon must ask the Patient how that Disease began; and if after some violent Exercise, there was a small Tumor, which from that Time appeared and disappeared several Times, he may in such a Case pronounce it an *Enterocèle*.

A Pain in the Tumor, a small Colick, Vomiting, and a frequent Inclination of going to Stool, without voiding any thing, are further Signs of the Descent of the Intestin.

AND if all those Accidents are attended with a Constriction of the Ring, by reason of its extraordinary Tension and Inflammation, the Pain will be much greater; there will be a Fever, and a
greater

greater and almost continual Vomiting; and all those bad Symptoms will encrease the more, because the Inflammation will grow worse, both by the Irritation, and the Matters detained in the compressed Intestin.

THERE are two Causes of the Vomiting: The first is the great Quantity of Matters in the Intestins: They are at first frothy; and the Patient spits often, and is very careful to cast up those Matters; for they might enter into the *Aspera Arteria*, and stifle him. As the Overflowing encreases, the chylous Matters, and at last the stercoral ones succeed the former.

IRRITATION is the second Cause of the Vomiting, which happens then suddenly; and because it is convulsive by reason of the Pain, the greater the Pain is, the more frequent and violent will the Vomiting be.

IN order to know whether the *Epiploon* only is the Cause of the Tumor, the Signs appear quite contrary; and if we may believe Books, those Signs are so true, that 'tis impossible to make a false Judgment about that Tumor. They distinguish it by its Softness and Unevenness. The *Epiploon*, say they, being a flabby and soft Membrane, its Descent must yield to the Impulsion of the Finger, and even its Impression ought to remain in it; and its fat Parts make it uneven.

THOUGH all those Signs do frequently foretell an *Epiplocele*, and are grounded upon the Structure of the Part, yet they prove sometimes false. Mr. *Chevalier*, sworn Surgeon of *Paris*, heretofore Master of his Company, and Demonstrator of Anatomy and Surgery, did lately perform that
Operation

Operation on a Woman, whose Tumor was hard, smooth, and considerably inflamed: The Patient had a great Fever, felt a violent Pain, and vomited continually.

THE Surgeon, considering all those Accidents, could not but think that it was a Tumor of the Intestin. He applied upon it a *Cataplasme*, and some time after he perceived a small Fluctuation, which was very deep. At last, the same Accidents remaining still, he performed the Operation, and found only the *Epiploon*, under which there was an Abscess. The Patient is perfectly recovered.

TO go on with the Signs of the *Epiplocele*, another Sign is to perceive a Tumor in the Circumference of the Belly, which lasts for some time without disappearing, and being much troublesome to the Patient: There is ground then to suspect that the *Epiploon* is the only Cause of the Disease.

AND if the *Epiploon* is a little straitened in the Tumor, for as much as it adheres to the Bottom of the Stomach, it will pull it down; which will occasion a small Hiccock: But if an Inflammation happens; if it be altered by an Abscess, or gangrened, there will be a Vomiting occasioned by the pulling down of the Stomach, or by the Corruption of the *Epiploon*, if at the same Time the Matters come out freely through the *Anus*. These Signs are also equivocal; for we have seen one of the Cells of the *Colon*, pinched in a Tumor, as I shall say hereafter, which occasioned a Vomiting, though the Matter continued to flow through the *Anus*.

LASTLY, if in a *Hernia*, which is reduced from Time to Time, either by the different Situations of the Body, or by gentle Pressions, there remains still something, and the Tumor does not appear to be less than one Half of what it was; it may be said that the Intestin and the *Epiploon* together are the Cause of the Disease.

THE crural *Hernias* differ from the Inguinal in that the floating Parts of the *Abdomen*, whereby they are occasioned, pass under a greater Arch, as I have said, which makes a less Resistance than the Ring of the *Obliquus externus*, through which the Inguinal pass.

THE same *Hernias* are also different from the Inguinal with respect to the Resistance of the Ring of the *Obliquus externus*, that is neither relaxed, nor lessened by Remedies, or by the most favourable Situation, which should be a moderate Bending of the Thigh. And if it be objected that Remedies, and such a Situation do frequently very much contribute to the happy Success of that Disease; I answer that those Remedies acting upon the Skin, and the Parts that are come out, must needs be very good; and that if the Parts, which occasioned the *Hernia*, be reduced, it is rather because their Bulk is lessened by the Remedies, than because the Ring is grown larger by its Relaxation, since its mechanical Structure is composed of tendinous, transverse, and longitudinal Fibers, which form an Arch, the two Pillars whereof are affixed to the *Pubes*, and consequently it cannot be encreased either by Poultices, or by the Situation. This Truth, for which I am
indebted

indebted to Mr. *Petit*, will never be questioned by those, who have handled the dissecting Knife.

AGAIN, the crural *Hernias* differ from the Inguinal in that they are more in the Fore-part of the Thigh, and directly in the Fold of the Groin; which is the Reason why the Surgeons, who do not sufficiently consider those *Hernias*, mistake them for a *Bubo*, because they pass under the Glands of the Groins, which in this Case are frequently swelled.

THE Prognostics ought to be grounded upon the Age of the Patient, and the Nature of the *Hernia*. If a Surgeon attempts the Reduction in a young Person, and if it succeeds, he may rely upon the Cure by using proper Bandages: But if the Patient be above thirty Years of Age, the Bandage will rather serve to support the *Hernia*, than to cure it radically.

WITH respect to the *Hernia*, if the Intestin comes out alone, the Disease is more dangerous, and more or less so, according to the Degree of the Constriction.

WHEN the Intestin comes out with the *Epiploon*, the Danger is neither so urgent, nor so great, because the *Epiploon* is a soft Body, which serves as a Quilt to the Intestin, and preserves it in part from the Compression of the Ring.

ACCORDING to this Explication, we may easily infer that if the *Epiploon* be alone in the *Hernia*, it will be attended with fewer Accidents; and consequently that the *Hernia* will be the least dangerous.

THE *Hernias* of the Belly are less dangerous than others: Those that take up the Interval of

the *Recti Abdominis*, from the Navel to the *Pubes*, are most of them incurable.

WHEN the Intestine is gangrened, Surgeons do not advise to perform the Operation; for the Patients commonly die: But because we have seen an Instance of its good Success, if the Relations of the Patient desire it should be performed, he must say that Death is unavoidable without the Operation, and almost certain with it: Wherefore he shall consult wise, learned, and prudent Surgeons.

THE most usual diagnostic Signs of the Gangrene are the Alteration of the natural State of the Tumor. For Instance, it ought to be somewhat raised, and round, and have some elasticity; for when the Intestine is come out, some Wind does always get into it; and though the Constriction be never so little, that Wind, which is elastick, distends the Intestine, and produces in it some Spring. The Skin ought not to change its Colour much, unless it inclines to red. Wherefore, if the Tumor be flat, soft, and without any Spring, so that the Impression of the Finger remains in it; if a considerable Alteration happens in the Colour of the Skin, which is grown livid or blackish, whereas before it was red; if the Patient feels no Pain in that Part where the Tumor lies, and the other Accidents continue still, such as a Fever, Vomiting, &c. if the Pulse is dense, and the Patient's Eyes look wild; all those Signs are plain Indications that the Part is gangrened, and the Patient in great Danger.

SOME Surgeons, not sufficiently considering the Accidents of those Tumors, took them for *Bubos*, and opened them with Causticks; a Remedy, which

which must needs occasion a great Disorder in those Parts.

ADHERING *Hernias* are also very dangerous, and give the Operator a great deal of Trouble. Mr. *Petit* cured one, wherein the Bag of the *Cæcum* adhered to the *Scrotum*. After he had separated that Intestine, it was in a Manner excoriated: He made the Dilatation at the Constriction, and reduced the Intestine into the Belly, which still adhered to the internal Circumference of the Ring. In the following Dressings, it appeared floating at the Orifice.

LASTLY, when the Inflammation is got into the internal Parts of the Belly, which may be known by its great Tension, and by the Navel's rising to a Point; those sad Accidents being attended with a hard Pulse, the Surgeon must not in that Case appear very willing to perform the Operation; for the Success of it is very doubtful: And if he be earnestly desired to undertake it, he must give Notice to the Relations of the Patient that he despairs of the Success of the Operation, and undertakes it only to comply with their Desires.

BEFORE I speak of the Cure of those Tumors, I must say something concerning the *Hernias* of the Bladder: Those Diseases have been newly discovered by Mr. *Petit* and Mr. *Arnaud*.

THE Bladder is also one Part of the Belly liable to *Hernias*. That Disease usually happens after a Suppression of Urine, which, remaining in the Bladder, distends it to such a Degree, that it is forced to ascend much above the *Pubes*; and the Urine encreasing more and more, an Inflammation ensues.

THE Bladder, being then pressed on all Sides, is forced to place it self towards the Groins, and to contract there some Adherence with the adjacent Parts, in consequence of its Inflammation.

A great Belly is also frequently the Cause of the *Hernia* of the Bladder, because the Womb, taking up at that Time the whole *Hypogastrium*, and part of the Belly, presses the Bladder much, and thereby produces two Accidents, which occasion sometimes one or two *Hernias* of the Bladder.

THE first of those Accidents is the Suppression of Urine, which happens only because the Neck of the Bladder is pressed by the great Bulk of the Womb; and in consequence of that Suppression, it encreases at last to a considerable Bigness.

THE second of those Accidents is a Consequence of the Compression of the Bladder against the *Pubes*, whereby it is forced to lye on one Side, and to occasion afterwards a *Hernia* in that Place. Or the Womb compressing the Bladder directly towards the *Pubes*, the Bladder is forced to lye on both Sides, and to represent, as it were, two Bladders; which occasions two *Hernias*.

THE natural Figure of the Bladder in Women is a further Confirmation of this System, since it is very different from that of Men. In Men, it represents a pyramidal Figure. But in Women, it is rather like a small Barrel situated transversely, or like a Triangle, the Basis whereof in the upper Part of the *Os pubis* forms two Angles; and the Top of the Triangle is the Neck of the Bladder.

THE Bladder being placed between the two Membranes of the *Peritonæum*; and the Bag, in the usual *Hernias*, being made by the Relaxation of

of its internal Membrane; it ought to be inferred from that Structure, that the *Hernias* of the Bladder never have any Bag. But if the Bladder descends into the *Scrotum*, or into the Lips of the Womb in Women, it will carry along with it the internal Coat of the *Peritonæum*, which coming near after it, will form in that Place a kind of Funnel, that will quickly be filled with the Intestine and *Epiploon*. Therefore in such a Case there will be two *Hernias*, one of the Bladder, and the other of the Intestine and *Epiploon*, if the latter be long enough; and those two *Hernias* will be situated one by another, and distinguished by the Bag, which is that Funnel formed by the internal Coat of the *Peritonæum*, and which covers the Intestine and the *Epiploon*.

THE Signs, whereby we know the *Hernias* of the Bladder, are a Difficulty of making Water: the Patient voids part of the Urine, and quickly after he voids as much again. He places himself in different Situations, and is frequently obliged to press the Tumor, and raise it higher, that he may make Water more freely.

ALL those different ways of voiding the Urine cannot be explained but by a Constriction of the Bladder, which divides it, as it were, into two. As soon as the Patient has voided the first Urine, he must alter his Situation, or press the second Tumor, in order to facilitate the Running of the Urine from that Tumor into the first, and from thence unto the *Urethra*.

WHEN that Disease is attended with an Inflammation, either in the Bladder, or by reason of the Constriction of the Ring, all the Symptoms

of the Nephretick Colick appear: But to avoid being imposed upon, one must examine the Urines, which make those Diseases very different from one another.

SOME Surgeons, in order to be more certain of the Fact, take care to probe the Patient. That Practice may be useful, when there is no Constriction; but there is one, which, as I have just now said, divides the Bladder into two, by forming a double Bag; the first Bag, continuous to the Neck of the Bladder, will be very much distended; and the usual Probe, having but a small Space to move in, would continually run against the internal Coat of the first Bladder, and might occasion in it more dangerous Accidents than those of the *Hernia* it self.

BESIDES, the second Bag, or that Portion of the Bladder, which makes the Tumor, could not be evacuated by the Probe, since the Constriction hinders the Passage of the Urine from one Bag into the other; unless the Surgeon prescribes to the Patient certain Compressions, and different Situations, as I have already said.

HAVING describ'd *Hernias*, examined the Signs, whereby we may know their Nature and Differences, and given a particular Account of most of those Accidents, which make them dangerous, I proceed to their Cure.

SURGERY affords us two Ways of curing *Hernias*. In the first Place, it directs us to a gentle Method, which our Authors have called *Taxis*, and which we know by the Name of *Reduction*. But if that Operation does not answer the Wishes of the Patient and Surgeon, the Art of Surgery,
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so necessary to Men, affords several other Operations, whereby many Persons have been preserved from Death.

I shall explain all those different Operations, beginning with the *Taxis*, or Reduction. As soon as a Surgeon is sent for to ease a Patient, affected with a recent *Hernia*, his only Design must be to reduce, if possible, into the Cavity of the Belly; those Parts that are come out of it; but he ought to know first what Sort of *Hernia* it is, that he may place the Patient in a proper Situation, and perform the Reduction more easily.

IF it be an inguinal, or crural *Hernia*, the Patient must lie down upon his Bed side, having his Buttocks raised higher than the rest of the Body. The Surgeon, being on the Side of the affected Part, must bend a little the Thighs of the Patient, especially that of the affected Side, and putting his right Arm underneath, (if the *Hernia* be on the right Side,) he must handle the Tumor gently and a long Time, without pushing it towards the Ring: By that Means he may dissipate the Winds and Matters contained in it. Afterwards let him, with the fore and middle Fingers, draw a little the Tumor downwards, and endeavour to find the End of the Intestin, that came out last. All those Circumstances being duly observed, the Surgeon shall make an End of his Operation, by laying his left Hand upon the upper Part of the Tumor, above the Belly; and using the fore-Finger and Thumb, he shall endeavour to reduce the Intestin, as he pushes it with the other Hand, beginning with that Part of the Intestin, or *Epiploon*, which came out last. If he cannot succeed in that Man-
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ner, he must shave the Hair growing upon the Tumor, and its whole Circumference, and warmly anoint the Part with an Embrocation. Here follows that, which is commonly used in the *Hotel-dieu* at *Paris*. They take three or four Yolks of Eggs, and six or seven Ounces of Oil of *Roses*, well mixed together, and warmed upon a slow Fire: And then they put into it a little Brandy; and with that Embrocation they rub the Tumor, its Circumference, and the Belly. But before those Remedies be used, it is not improper to blood the Patient in the Arm. This Caution is approved by all learned Surgeons; it facilitates the Success of the Operation, by emptying the Vessels, and lessening the Inflammation.

AFTERWARDS the Surgeon applies upon the Tumor a resolving and emollient Poultice. That which is commonly made at the *Hotel-Dieu*, in such Cases, being approved by very great Surgeons, ought to be set down here, as a good Remedy.

THE Operator takes emollient Herbs, such as *Mallows*, *Marsh-mallows*, *Mercurialis*, the *Pellitory of the Wall*, and the *Violet-plant*: He boils them in a sufficient Quantity of Water. Afterwards he strains them through a Sieve, and extracts the Pulp with a Spatula.

In the next place, he dissolves that Pulp in the Decoction, and with that Mixture he dilutes some Rice and Line-meal. He boils that Mixture with a slow Fire, stirring it always; and when it has been one or two Hours upon the Fire, he adds to it common Honey and Vinegar, and boils again the Whole at least half an Hour. Lastly, he judges that it is sufficiently boiled, by the Smell
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of the Poultice, which ought not to be like that of Meal; and before he takes it from the Fire, he adds to it some Oil of Lillies.

THAT Poultice has a very good Effect; but it requires great Care and Patience. Mr. *Petit* pretends, that when it is not well boiled, it does more Harm than Good. But because that Poultice is a long time a boiling, and the Patient would not be eased soon enough, the Surgeon, in the mean time makes another with the Crum of Bread.

HE prescribes Clysters made with a Pint of good warm Claret, and a Glass of Walnut-Oil. Mr. *Thibaut* adds three or four Drams of Sugar, and says they have a good Effect, especially after the Operation. If the Surgeon has a mind to make those Clysters laxative, he puts into them common Honey, or Lenitives.

THE next Clyster is also very good, *viz. A sufficient Quantity of Milk, a Glass of Walnut-oil, and some Cinamon. The Cinamon must be bruised, and boiled in the Milk; and then the Whole must be strained, and the Oil added to it.*

WHEN the Poultice made with the Crum of Bread has been two or three Hours upon the Tumor, or, to speak more properly, till the first Poultice be boiled, the Surgeon takes it off, and wipes his Fingers, and the Skin, which is fat and moist, that he may operate more safely, and make again the same Trials, for the Reduction of the Tumor.

IF those Operations are ineffectual, the Surgeon must apply the Poultice, which we suppose to be now boiled, and blood the Patient plentifully, according to his Strength; and if Phlebotomy proves useless for the Reduction, the Operation, which is
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the last Remedy, will be more successful, and attended with fewer Accidents. Phlebotomy is the quickest and best Remedy we have in Surgery; but I never saw the good Effect of it in an Inflammation, unless it be very frequently repeated.

TWO Hours after, the Surgeon must take off the Poultice, wipe, as I have just now said, the Skin, and his Fingers, and attempt again the Reduction.

IF it be an inguinal *Hernia*, he must move the Parts towards the Bone of the *Iliac*, that he may follow the Course of the Rings: On the contrary, if it be a crural one, he moves them towards the middle of the Belly, or towards the *Pubes*; because the Arch of the crural Vessels is more turned that way: This is Mr. *Petit's* Method. If the Surgeon has not as yet succeeded, he applies still upon the Tumor the same Fomentation, and upon the Belly the Poultice, which he warms: He goes on with Phlebotomy and Clysters. Lastly, if those Remedies prove ineffectual in four and twenty Hours, and the Accidents remain still, he must proceed to the Operation.

THE Surgeon ought to be very prudent in this Sort of Diseases, and express no Desire of performing the Operation, till he has endeavour'd to succeed in the Reduction. Those Tumors must only be handled by able Surgeons; because if they do not succeed, they do but make the Disease worse than it was.

NOR must a Surgeon insist upon curing the Tumor without performing the Operation; for sometimes he suffers things to come to that pass, that
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when there is no other Remedy left but the Operation, the Patient dies.

Mr. *Arnaud*, and Mr. *Thibaut* were sent for at the same time to see a Patient, who had a *Bubonocèle*. The Tumor was round and raised: They used the utmost Care to facilitate the Reduction; and being not able to succeed in it after many Attempts, they advised to perform the Operation. The Patient and his Relations were against it, and suffered themselves to be deluded by an Empirick, who pretended to cure the Tumor, without opening it. After he had applied all his Remedies, and handled the Tumor a great many times, he could not succeed in his Undertaking: Whereupon the Patient and his Friends had Recourse to those illustrious Surgeons.

As soon as they saw that Tumor, they perceived a great Alteration in it. Whereas before it was round and raised, they found it very flat, soft, and livid. Having well examined the Disorder occasioned by that Empirick, they acquainted the Patient and his Relations with a very sad Prognostick. However, being desired to perform the Operation, they went about it; and having opened the Bag of the *Hernia*, they found the Intestin livid, and very black in one place. They reduced it into the Belly; and soon after there came out of the Wound some fecal Matters, whereby it appeared that the Intestin was pierced: But those Matters coming out freely, there was ground to believe that the Orifice of the Intestin was parallel to that of the Ring. That Ejection lasted about five and twenty or thirty Days, without any Extravasation in the *Hypogastrium*.

THOSE

THOSE Gentlemen, contrary to their Custom, did not put a Tent into the Wound, for fear of pushing the pierced Intestin into the Belly; but they only dressed the Wound with tied Dozels. The Patient is perfectly recover'd, abating a small *Fistula*, which remains. He carries Night and Day a Bandage made for that purpose. A small Compress, dipt in Brandy, is laid upon the *Fistula*, and the Bandage over it. The Compress is hardly stained in a Fortnight; which is a very inconsiderable Accident after so great a Disease.

THIS History teaches us how dangerous it is to suffer an *Hernia* to be handled by Men, who do not foresee the sad Consequences of it, and do not use the necessary Cautions to prevent the Increase of the Disease, whilst they pretend to cure it. I shall make hereafter some Reflections upon the Dressing, and draw some Consequences from it.

IF the Patient be affected with an *Exomphalous*, the Surgeon must begin with a gentle Method, as well as in crural and inguinal *Hernias*, and therefore he shall place the Patient in a good Situation, which consists in having the Buttocks and the Breast somewhat raised.

THE Surgeon shall press the Tumor perpendicularly, contrary to the *Bubonocèle* and the crural *Hernia*, as I have explained it; and if he cannot reduce the Intestin, he shall use the Fomentations and Poultices I have just now described, taking care to blood the Patient plentifully, and to give him Clysters. He must repeat those Remedies, as well as in other *Hernias*, as often as he thinks fit.

WHEN a Surgeon is so happy as to succeed in the Reduction, he perceives it by the Noise, which
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the Intestine makes in being reduced. The Pain, which the Patient felt in the Tumor, ceases, and the other Symptoms vanish by degrees.

AFTER this happy Success, the Surgeon must endeavour to shut up the Hole through which the Parts came out: Wherefore he shall apply, in the place where the Tumor was, several graduated Compresses, supported by the same Bandage, which I shall describe after the Operation.

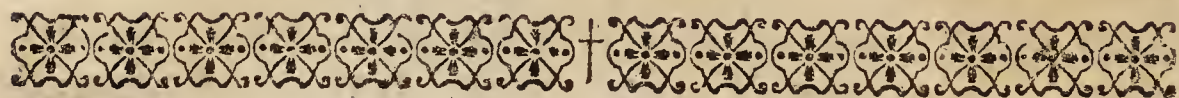
THE Surgeon leaves that *Apparatus* a longer or shorter time, according as it grows loose. I have cured many Children after that manner.

IF the Patient be more advanced in Years, and has occasion to go about his Business, the Surgeon shall put upon him, after he has used for some time the Bandage which I shall describe, a Steel-Truss: There are some of different Figures, according to the several Sorts of *Hernias*: And if it be an Exomphalous, there ought to be in the Middle of its Body, an Eminence half-spherical, which exactly stops the place, through which the floating Parts of the *Abdomen* came out.

PHLEBOTOMY and Clysters ought not to be neglected; and the Patient must lie down, or sit upright, since the Bandage is more compressing in those Situations.

Mr. *Dionis* says in his Operations, that it happens sometimes that Children have but one Testicle in the *Scrotum*, and that the Testicle of the opposite Side lies concealed in the Groin; so that the Parents perceiving a small Tumor formed by it, send for a Surgeon, taking it for a *Hernia*. This ought to be carefully examined; for it would
be

be a sad thing to perform upon a Testicle the same Operations, that are performed in a true *Hernia*. This Observation appears to me very material.



CHAP. VI.

Of the Operation of the Bubonocoele, and the crural Hernia.

IF the gentle Methods we have proposed, are insufficient for the Reduction of *Hernias*, and if the Symptoms continue to be urgent, the Surgeon must open the Tumor; but because that Operation is more or less dangerous, according to the Symptoms attending the Disease, a prudent Surgeon will not undertake it, without a Consultation, that the Patient, and his Friends, may know what is to be feared or expected from the Event.

I am not ignorant that the Operation is always dangerous, and that the Patient is like to lose his Life by it: But if the Surgeon goes about it in due time; if the Patient be a Person of a good Constitution; if the Tumor has been handled by none but able Practitioners; if the patient has been plentifully bled; if there be no Inflammation in the *Viscera* of the *Abdomen*, (which may be known by a pretty regular Pulse, by the Figure of the *Abdomen*, wherein no Alteration will appear, chiefly by the Figure of the Navel) one may very well hope

hope that the Operation will be attended with a good Success.

To perform that Operation methodically, the Patient must in the first place make Water: The Usefulness of this Advice is so obvious, that I need not explain it. Afterwards the sick Person must be placed in a proper Situation. He must be brought to his Bed-side, and laid down upon the Back: His Buttocks must be raised, and his Belly and Thighs covered with warm Napkins, folded double.

THE Thigh of the affected Side being a little bended, to relax the Skin, the Surgeon shall pinch it in the Tumor with his left-Hand, and a Servant shall do the same, and both of them together shall raise it as much as they can.

THE next thing is to cut the Skin, which is upon the Middle of the Tumor, and which we suppose to be raised; but because there are different Ways of using the Instrument, and the Incisions of different *Hernias* ought to be made differently, I shall propose some Reflections upon them.

IF it be an inguinal *Hernia*, the Openings of the Muscles being brought near one another, and all of them together taking a perpendicular Course, the Incision must be longitudinal. But if it be a crural *Hernia*, the Arch of the crural Vessels being situated transversely, and yet the external Branch being somewhat higher than the internal one, the Incision must be made transversely, and somewhat obliquely to follow the Direction of the Groin.

THERE are also, as I have just now said, different Ways of cutting the Skin. Some advise the use of a strait *Bistouri*, and to pierce the Skin, by
I turning

turning the Back of the Instrument towards the Tumor. Others will have the Skin to be cut perpendicularly with the Edge of the *Bistouri*, putting the fore-Finger on the Back of it. I am willing to follow this last Method, provided the Surgeon cuts only the Skin at first, and a little of the fat Body; and I take it to be preferable to all other Methods; because the Surgeon sees what he cuts.

BUT if some Accidents should distend and inflame the Skin to such a degree, that it could not be pinched, as it happen'd in the *Epiplocele*, above-mentioned, which was attended with an Abscess; in such a Case, the Operator should put the middle-Finger and Thumb on both Sides of the Tumor, and distend the Skin transversely, to cut it by a longitudinal Incision.

THIS Method ought to be used gently; and as soon as the Surgeon perceives the fat Body, he must quit the *Bistouri*, and take in the room of it a grooved Probe, and introduce it under the Skin; and he must convey into the Groove of the Probe one Blade of blunt Scissors to cut the Skin. He must do the same downwards, if this last Incision was made upwards.

WHEN the Skin in the Middle of the Tumor is cut longitudinally after one of those two Methods, the Surgeon takes with the Thumb and fore-Finger of one of his Hands the Lips of the Wound one after another; and with the fore-Finger of the other Hand, he dissects the Skin in the Circumference of the Tumor, especially in the upper and lower Part: Afterwards he conveys upon his Finger blunt Scissors, to enlarge the Opening through

through the Angles. This is Mr. *Arnaud's* Practice.

THE Surgeon enlarging that Incision through the upper Angle, does sometimes open an Artery, which emits Blood with great Violence. The Operator ought not to be surpris'd at it; for 'tis only a small Artery, which loses it self upon the Fat, and in the Skin, and may easily be stopp'd.

To go on with our Operation, the Surgeon must cut and tear the Membranes, that cover the Bag: They are called *Laminae*. Mr. *Duverney* says, they are only small fat Cells. Mr. *Windslow* says, that those small Membranes, which are between the fat Body and the Bag, are nothing but the cellulous Texture of the *Peritonæum*, which is very much encreased by the Disease. But whether they be small Cells or *Laminae*, they ought to be cut and torn.

IN order to cut those Membranes or *Laminae*, I must make several Observations. First, the Surgeon must use a *Bistouri* somewhat crooked and very sharp; and its Blade must be fastened to the Handle with a Fillet. Though this Method differs from the Practice of those, who make Use of Fleames, yet it is very good, and approved by the greatest Masters. Secondly, the Operator must distend those Membranes transversly with the Thumb and fore-Finger, as it was practiced in the Skin, when I supposed it to be inflamed; and by this Means the Surgeon has the Pleasure of seeing those Membranes contract on each Side, as he cuts them, and besides he always sees what Progress the Instrument makes. Thirdly, he must lay the Instrument almost flat, (the Edge being turned to-

wards the *Penis*,) and cut the Membranes slanting: For if he should lay the Edge perpendicularly upon the Tumor, the Sight being confined at the Back of the Instrument, he might open the Bag and the Intestin: Which would not be difficult, if the *Hernia* was dry, as it happens sometimes in inguinal *Hernias*; and in this Case, a Surgeon ought to use all the Dexterity, which that Operation requires. Fourthly, he must carefully observe all the Vessels he discovers, whether they be Veins or Arteries, to tie them in two Places before he cuts them; and by this Means he will perform the Operation almost without any Effusion. The better to succeed in this Particular, he must have many Rags of Linnen, to wipe the Blood, as it appears.

LASTLY, The fifth Observation consists in pinching with the Fingers the small Membranes, that have been cut, to tear them on every Side; and when they make too great a Resistance, the Surgeon drives underneath a grooved Probe, and conveying blunt Scissars into its Groove, he cuts them.

IF the Operator thinks he has discovered the Bag by all those Means, he must be sure of it by pinching the Bag with his Thumb and fore-Finger; and if he raises then a membranous Part, he will be fully convinced of it. In this Case, he must discover the whole Bag, without opening it, and with its Help introduce a grooved Probe beyond the Constriction, which he must dilate, as I shall say hereafter, when I come to discourse of the compleat *Hernia*.

THE Reader may already perceive, that I do not design to treat of the Operations commonly performed in the Bag, as all Books and Surgeons do; and we are indebted to Mr. *Petit* for the gentle and easy way of performing those Operations, and the safe and speedy Method of curing those Diseases.

WHEN the Surgeon has discoverd the whole Bag, and dilated the Constriction, as I shall say in the next Chapter, Mr. *Petit*, a Man of a vast Genius, and a great Practitioner, advises him to reduce the Parts contained in the Bag without opening it: Which is effected by that excellent Operator in the following Manner. He takes the Bag with the fore-Fingers and Thumb by its Extremity the most opposite to the Constriction, and with certain circular Motions he reduces the Parts into the Belly. In the inguinal *Hernias*, he drives them towards the Bone of the *Iliac*, as I have already observed; and in the crural ones, towards the Navel and the *Pubes*. As soon as the Reduction is over, he folds up the Bag, and puts it in the very Opening of the Constriction, and above it a small Cushion of his own Contrivance.

To make that Cushion, the Surgeon takes a Piece of Linnen, which he cuts round, and sows in its Circumference, as if he had a Mind to make a Button. He draws the Thread by one of the Ends, having stopped the other; and the round Piece of Linnen shuts, folding its self like a Purse. He puts into that Purse some Lint, and some small Rags worn out; and when it is filled up, he pulls the Thread more, and turns it round about, as if he was stopping a Button.

AFTERWARDS he dips that Cushion in a Mixture made of the White and Yolk of an Egg, to which he adds a little Brandy. He squeezes that Cushion, and having rolled it in his Hands to draw it out in Length, he applies it upon the Bag of the *Hernia*; and above it, as well as in its Circumference, he lays some Rags and Dozels. He covers that *Apparatus* with three or four triangular Compresses rising to a considerable Height, to press all the Parts; and he supports the whole with the following Bandage, called the *Spica*. But before this, he must use the Imbrocation, which I have already described.

Of the Spica of the Groin, for the Bubonoccele.

TO make that Bandage, the Surgeon takes a Roller, three Inches broad, and about thirty Feet long. He puts the End of the Roller upon the Side opposite to the affected Part, where a Servant holds it; and then he conveys the Head of the Roller upon the external and upper Part of the Thigh on the Side of the Operation, and behind, to come to the internal Part of the same Thigh, in order to ascend upon its upper and fore-Part, where he crosses with the foregoing Convolution, to form a K in the Middle of the bending of the Groin. Afterwards he conveys the Roller to the opposite Side, passing beyond the Body, and begins again the same Circumvolutions just now described, forming in the Groin an Edging, as he ascends, which makes the *Spica*, as I shall explain it, discoursing of Bandages. But when he comes the third time to the external and upper Part of the

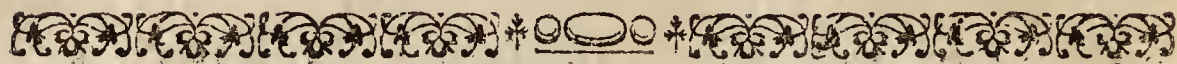
the Thigh, he passes the Roller behind the Thigh, as I have already said, to ascend to the internal Part of the Groin; and instead of crossing with the foregoing Convolution, to form a K, and make an End of the *Spica*, he fastens the Roller with Pins, turns it back, and passes again by the internal Part of the Thigh, to cover the Compresses: Afterwards he conveys the Roller behind the Thigh, to come to its external and upper Part; from whence he conveys the Head of the Roller to the opposite Side, to make an End of that Bandage with Circulars about the Body.

THIS Method of reducing the Bag without opening it, though new, will be very much approved for the time to come; and Operators must not scruple to use it, since the Inventor of it had no other Design but to cure speedily, to operate safely, and to follow Nature Step by Step. She is a wise a Leader, by whom Physicians and Surgeons ought to be directed; and she will never deceive them, if they take care to follow her Directions.

INDEED, if all the Methods I have proposed for the Reduction, without opening the Tumor, had been attended with the Success we expected from them; what would have become of that Bag? Would it not have been reduced with the other Parts? Or, would it not have remained in the opening of the *Abdomen*? We see every Day that those Sorts of Reductions are not attended with any Accidents, and that they are cured immediately.

THE Patient must be nourished with Broth and Jelly: He must take a Clyster now and then;

add the general Remedies ought to be prescribed according to the Accidents, that happen.



C H A P. VII.

Of the Operation of the compleat Hernia.

ACCORDING to the Doctrine, that is now taught in the publick Schools, there are two Sorts of compleat *Hernias*. In the first, the Testicle is separate from the Bag of the *Hernia*; and in the second, the Testicle is confounded in that Bag with the Parts that make the *Hernia*. I shall give a mechanical Explication of those Differences, when I come to discourse of the *Hydrocele* by effusion.

To perform the Operation, the Surgeon must place the Patient in the Situation mentioned by me, when I discoursed of the *Bubonocoele*, and take Care that he make Water, to empty the Bladder, which might be pricked in dilating the Ring: This might be done more easily still in Women big with Child, because the Womb, as I have shewed, throws the Bladder upon the Sides.

THE Surgeon pinches the Skin, and cuts it according to the Length of the Tumor, as it's practiced in the *Bubonocoele*. He also stretches the Membranes to cut and tear them. And if he will reduce the *Hernia* without opening the Bag, he

he lays it open in its whole Extent, and dilates the Constriction, &c.

THIS may be practiced in any *Hernia* whatsoever, (excepting the ventral *Hernias*, which attend a Wound,) provided the Bag be not so large, and the *Hernia* so old, that one may be sure, the Intestine and *Epiploon* adhere to the Bag.

IF the Operator thinks fit to open the Bag, as soon as he has discovered it, he pinches it, as well as the Skin, and cuts it gently with a Bistouri; and immediately there comes out a limpid or ruddy Water, of which those *Hernias* are always full; which very much facilitates the Operation.

HE introduces into that small Opening a grooved Probe, with which he raises the Bag, to enlarge the Opening with Scissors. Afterwards he puts the middle Finger into that Opening, that he may by that Means slide blunt Scissors, in order to open the whole Bag.

IF the Testicle does not appear after that Opening, 'tis a Sign the *Hernia* is of the first Kind, and that the Parts are only descending as far as the Partition formed by the *Tunica Vaginalis*, as I shall say, when I come to discourse of the *Hydrocele*. The Surgeon must then take great care of the Testicle, which lies hid under the Angles of the Bag, or even lower, and he must particularly mind it, when he reduces the Intestine; he must also mind the spermatick Vessels, for fear of conveying them into the Belly with the Intestine, or compressing them too much.

ON the contrary, when the Tumor is opened in its whole Length, if the Surgeon perceives the Testicle is confounded with the Intestines, 'tis a Sign

Sign the *Hernia* is of the second Kind; and there will be no need of so much Caution, because he always sees the Testicle.

AFTER the opening of the *Hernia*, the Surgeon must reduce the Parts into the Belly; but because several Obstacles hinder it, I shall endeavour to remove them.

THE first Obstacle is the Constriction of the Ring, which will no longer compress, when it is dilated. To remove it, a Servant must raise the Ends of the Bag, and the Operator convey into the Ring a grooved Probe, closed at the End, and then raise it to distend the Ring, and remove it from the Intestin. He must take care to convey the Probe, rather on the Side of the internal Pillar of the Ring than of the external one, because he goes farther from the epigastrick Artery.

THE Probe in that Situation is sometimes covered by the Swelling of the Intestins, which hide the Groove of that Instrument. A Servant must then take the Intestin on both Sides of the Probe; and to prevent having so many Servants, Mr. *Petit* has contrived a Probe, which has in the Middle of its Body a Plate like a Heart: That Plate applying it self upon the Intestins, hinders them from covering the Groove of the Probe. Afterwards the Operator conveys a *Bistouri* somewhat crooked into the Groove of that Probe, laying it near the Hand that holds the Probe, and at some Distance from the Parts that are to be cut, lest he should commit some Fault, if any body should push him. He conveys the *Bistouri* about two Lines beyond the Ring, the Point being always hid in the Groove of the Probe; and as soon as it

it has passed the Ring, he lets down the Hand that holds it, bringing it near the Hand that holds the Probe; and by that small Motion the Point of the *Bistouri* leaves the Groove of the Probe, and makes a kind of Swipe whereby it is raised up.

THOSE two Instruments remaining in that Situation, the Surgeon draws them all at once, moving the left Hand which holds the Probe, and bringing it towards the Ring that is to be cut. Such is the Method of dilating the Ring.

THE Surgeon must observe, in the first Place, to convey the *Bistouri* towards the internal Pillar of the Ring, as I have said of the Probe: Secondly, to fasten its Plate to the Handle with a Fillet: thirdly, to hold it with the right Hand, the Back in the Groove of the Probe, and the Handle in the Hand.

Mr. *Arnaud*, in order to dilate the Ring, uses a small *Bistouri*, the Plate of which is commonly shut up in the Probe. I shall describe it, when I come to discourse of Instruments. The Surgeon conveys it side-ways under the Ring; and laying the Thumb upon its Spring, he raises the Plate, which drawing the Instrument, cuts the Ring.

WHEN Mr. *Thibaut* performs that Operation, he conveys under the Ring a grooved Probe, blunt at the end, and making a Servant hold the Intestin, he holds the Probe with the left Hand, and takes a strait *Bistouri* with the right Hand, in the same manner as if it was a writing Pen; and conveying it with the Back in the Groove, he cuts the Ring with the Edge of the Instrument: Afterwards he lets down the Probe and the *Bistouri*, and then draws

draws them out. This Method appears to me likewise very good.

Mr. *Petit* prefers his *Bistouri* (which I have described, speaking of the *Gastrorhaphy*) to all the Methods of dilating the Ring, and says, it may be conveyed into the Groove of the Probe, or without the Probe, and boldly driven, without being afraid of piercing or cutting any thing. He further says, that Dilatation may be made with one of the Branches of blunt Scissors.

As soon as the Dilatation of the Ring is made any of these Ways, Mr. *Arnaud* advises the Surgeon to introduce the fore-Finger into the Opening, and to raise it towards the internal Part of the Muscles, in order to know the Place where the epigastric Artery lies ; which may be known by its Pulsation : And when he has found it, he conveys the Finger a little side-ways to avoid it, and then crooked Scissors, blunt at both Ends, to enlarge the Opening.

If the Operator, in that Dilatation, has had the Misfortune to open the epigastric Artery, he must find out, as soon as possible, the place that is opened ; which he will know, not by the Pulsation of the Artery (for an Artery never beats where it is opened,) but because the Blood will stop, when the Finger keeps it from coming out.

THE great Quantity of Blood of that Artery proceeds from near the *Iliac* ; and the Surgeon ought to use his utmost Endeavours to stop it, by putting two or three small Rags upon the Opening, which a Servant shall drive towards the Bone
of

of the *Ilia*, whilst the Operator makes an end of his Operation, as I am going to shew.

AFTER all those Operations, the Parts, that make the *Hernia*, ought to be reduced ; but a second Obstacle does frequently happen ; and it must be removed, as well as the first, before the Surgeon goes about to reduce the Intestin. This second Obstacle is too great a Quantity of Matters in the Intestin, whereby it is swelled to such a degree, that it cannot be reduced before they are reduced into the Belly : This must be done by that part of the Intestin, which is nearer the *Anus*. In order to it, the Surgeon must draw a little that part of the Intestin, which came out last, that the Matters may have more room to be reduced.

HE must handle the Intestin gently to divide the Matters, that have stagnated in it ; and if the *Hernia* is on the right Side, he must drive them by degrees into that part of the Intestin, which is nearest to the *Ilia*.

ON the contrary, if it be on the left Side, the Matters must be driven into that part of the Intestin, which is overagainst the *Anus* ; and then the Surgeon must reduce them, beginning with the Part that came out last, in the same Manner as I have explained it, speaking of the *Gastrorrhaphy*.

IF the Mesentery is come out, and consequently a great Quantity of Intestins, the Operator must begin with the Reduction of the Mesentery, without which he would never be able to reduce the Intestins. The following History will make the Readers sensible of the Importance of this Observation.

A Man who had been troubled with a complete *Hernia* for some time, was kicked by a Horse; and that Blow bruised the Skin, and burst the highest part of the Bag. The Intestins came out of the Tumor plentifully, and occasioned a second *Hernia*, which reached to the Middle of the Thigh, and appeared as big as the Head.

Mr. *Petit* tried several times to reduce the Parts into the Belly; but the Bag of the first Tumor bursting, and having occasion'd by its Inflammation a Constriction, which prevented the Reduction of the Parts, all his Endeavours proved useless. Wherefore he resolv'd upon the Operation; and after he had opened that large Tumor in its whole Length, he found no Bag in it, but a little Blood, and a great bulk of swelled Intestins, with a considerable part of the Mesentery, which were come out thro' the Gap of the Bag of the first *Hernia*.

THAT Length of Intestins was only covered with the Skin and Fat; and Mr. *Petit* conveying his Finger towards the Constriction, which was only in the torn part of the Bag, did not find it very considerable: However he cut it upon his Finger with crooked Scissors, and went about to reduce the Intestins into the Belly. They were so much swelled, that when he had reduced a small part of them; they came out again immediately. At last, he had a mind to pierce them with a Needle, that the Wind might come out; but having attempted to reduce a small part of the Mesentery, the Intestins that followed it, did not come out again; by that means the rest of the Operation was very much facilitated. The Patient
was

was plentifully blooded: He took several Clysters, kept to a strict Diet, and recover'd his Health.

IT appears from this Observation, that when the Mesentery comes out, the Surgeon must reduce it, and immediately after, that part of the Intestin, which adheres to it, and so on, till the Whole be reduced.

LET us resume our Operation, and take Notice of a third Obstacle to the Reduction of the Parts, which are the Cause of a *Hernia*; I mean the Adherence of the Intestin, or *Epiploon* to the Bag, or to the Testicle; or of those two Parts together.

IN order to remove this Obstacle, it is absolutely necessary to dissect the Parts, and divide them from their Adhesion. But if the Adherence be in the Intestin, it must be dissected in such a manner as not to be damaged. If the Adherence be in the *Epiploon*, and it adheres to the Testicle, the *Epiploon* must be cut, and the Testicle left untouched.

LASTLY, if the Intestin adheres to the Testicle, most Authors are for Castration. I would rather separate them, preserving always the Intestin whole, and saving as much of the Testicle as possible: I am persuaded, it might be cured by a careful Dressing.

DID not Mr. *Arnaud* frequently open an Abscess in the very Body of the Testicle, which was well cured? Why should it be impossible to cure a Wound made in that Part by a cutting Instrument?

IF the Surgeon perceives that the *Epiploon* is grown larger, he must make a Ligature in it, and extirpate it in the same manner as I have explained in the Chapter of the *Gastrorhaphy*.

LASTLY, if the Operator has cut the Intestine, by opening the Bag, he ought to make in it the Skinner's Suture, as I have described it in the *Gastrorhaphy*; and that Suture may have a better Success than in the Wounds of the *Abdomen*, since the Matter does naturally come out of that Cavity.

LASTLY, In this Operation, as in all others, the Surgeon must have small Rags to wipe the Blood, and to perform a drier Operation; and for the same Reason, he must make a Stitch in all the small Vessels, that are troublesome during the Operation.

WHAT remains is to apply the *Apparatus*, about the first part of which Operators are not agreed. Some, and among them Mr. *Mery*, Mr. *Arnaud*, and Mr. *Thibaut*, use a Linnen-Tent very long, to keep the Openings of the Muscles always open, and parallel to each other, in order to give an Issue to the *Serosities* that are in the Belly.

OTHERS, siding with Mr. *Petit*, are altogether against the Use of that Tent. They say, that Method does very much retard the Cure, and occasions the communication of the outward Air with the inward; which may be attended with sad Consequences.

Mr. *Arnaud* confirms his Practice by an Experiment he made at *Paris* upon a Woman, who had undergone the Operation of the *Bubonocoele*. Having used two or three times a very long Tent, he

he was obliged to go into the Country, and desired a Surgeon to take care of that Woman in his Absence. When he came to Town again, he found the Patient in a much worse Condition. Her Belly was prodigiously distended and swell'd; she felt very sharp Pains, and had a violent Fever. He took off the Dressing, and found it very dry, having but one very short Tent. He convey'd his Finger into the Wound, and perceived that the Ring of the *Obliquus internus* was stopped. He removed that Obstacle with his Finger, and got in to the Belly: There came out immediately a stinking Matter mix'd with Blood; and having put a Tent into the Orifice, the Accidents vanish'd the next Day, and the Dressing was moist.

THAT Surgeon adds to this Experiment an Argument, which confirms the happy Success of that Disease, and the Consequences that may be drawn from it according to his System.

HE says, the *Peritonæum* and the Intestins are attended with a vast Number of small Glands, which being compressed by the Efforts that occasioned the Disease, have discharged a *Serum*, which falling into the Belly, ferments, and is the Cause of many Accidents like those just now mention'd. He further says, that the only Way of curing the Disease, is to give an Issue to that *Serum*, without which it contracts such an Alteration, that it gangrenes all the *Viscera*, and Death will unavoidably follow.

I confess, this Argument, confirmed by Experience, is very strong; and upon this Occasion it was given in order to preserve the Patient's Life. But it may be said, that the sad Accidents, which

happened to her, were occasioned by the Surgeon, *who wiped the Wound too carefully, and made it bleed in its whole Circumference*: And the Wound being all the while exposed to the Air, which perhaps was very cold, the Orifices of all the small Vessels did contract, and the Blood being coagulated in them, there happened an Inflammation, which occasioned the Pain, the Tension of the Belly, and a Fever; and those sad Symptoms would have brought the Patient to her Grave, had it not been for Mr. *Arnaud*, who removed the Obstacle by discharging those Vessels.

BESIDES, it may further be said, that the Lymph filtrated by the Glands of the *Peritoneum*, and Intestins, is a very useful Secretion, and serves to moisten all the *Viscera*, that they may gently slide one upon another, and not be irritated by their Friction: And though it be separated by some Efforts, in a greater Quantity than usually, yet it will not contract a greater Malignity, but it will be carried off by the absorbing Glands, that are in all the Parts, and by the Vessels themselves. Wherefore that *Serum* will occasion no Disorder, unless it has been altered by the Air.

AGAIN, Don't we see Dropsies, the Water of which might more easily occasion Disorders, that are perfectly cured, without the Help of the *Paracentesis*? Because that *Serum* is resumed by the absorbing Glands, driven by Stool and Urine, and sucked in by the Vessels.

NAY, the Experience of those, who approve the Tent, shews that it is not necessary to cure that Sort of Disease; and if the Thing be narrowly enquired into, it will appear by that very Experience that the Tent is hurtful. I

I have set down in the foregoing Chapter the History of the *Bubonocèle* cured by Mr. *Arnaud* and Mr. *Thibaut*; and I have said that the *Feces* coming out through the Wound, made them apprehensive that a long Tent (which would have opened a Passage to the *Serum*, from whence the Disorder must proceed) would have driven the pierced Intestin into the Belly, and occasioned the Fall of those same Matters into that Cavity. Which is the Reason why they were contented to put into the Wound tied Dozels; and yet it was cured.

IF the Lymph, separated by the Glands of the *Peritonæum* and Intestins, had occasioned the Accidents, which happened to the Woman above-mentioned, and if that Lymph had the same Effect in all sick Persons, unless it was evacuated through a Passage kept open for that Purpose, those Gentlemen would not have been so successful in that Operation, since the Tent was an Obstacle to the Cure.

To confirm my Opinion, and shew, that the Tent is not only useless in many Cases, but also sometimes hurtful, I shall set down the History of a Cure performed by Mr. *Mery* in the *Hotel-Dieu* at *Paris*.

THE 7th of November 1713. he performed the Operation of the *Bubonocèle* upon a young Man of Eighteen or Twenty Years of Age, who had been troubled with that Disease two Days. The Bag being opened, he found that the Testicle was confounded with the Intestins, and that it was in the Ring of the *Obliquus externus*; whether it had ascended by reason of the Inflammation, or was there originally.

THE Reduction of the Intestins being over, Mr. *Mery* says, that if a long Tent had been put in to keep up the Opening of the three Rings, it would have compressed the Testicle to such a Degree, that not only an Inflammation, attended with sad Accidents, would have ensued in that Part, but also it would have grown lean and destitute of Nourishment, and at last it would have been wholly separated. To avoid all those Symptoms, he put into the Wound some Dozels, &c. The Patient did perfectly recover in four Weeks.

THESE two Instances shew therefore, even by the Experience of those Surgeons, who use a Tent, that it was hurtful in those Cases. And since the Patients did quickly recover without its Help, and there was no considerable Tension in the *Abdomen*, nor any violent Pain, or Fever, it appears that those Accidents do not proceed from the Lymph of the Glands of the *Peritonæum* and Intestins, detained in that Capacity. Therefore, according to the same Experiments a long Tent is useless.

LAST May 1718, I saw a crural *Hernia* of a Woman, the Operation of which had been made by Mr. *Petit*, without opening the Bag: He only made use of his Cushion; and the Patient, tho' advanc'd in Years, was well cured in eighteen Days, without any Accident.

LASTLY, here follows another Argument, which is unanswerable. If the *Serum*, separated by the Glands of the *Peritonæum* and Intestins, by reason of violent Efforts, such as Vomiting, and others that attend *Hernias* with a Constriction; if that *Serum*, I say, was the Cause of the said Accidents, which sometimes follow that Operation, by be-
ing

ing detained in the Belly, for want of a Tent to keep the Passage open, how shall we explain the frequent Success of the *Taxis*? What will become of the *Serum* in a like Case?

THIS Observation, which appears to me unanswerable, was imparted to me by Mr. *Verdier*, one of the great Anatomists of our Time. I should here bestow upon that excellent Surgeon the Praises he deserves; but the particular Esteem, which all the Learned express for his uncommon Merit, and the great Obligations he has laid upon young Surgeons, are above whatever I could say of him.

WHEN the epigastric Artery is opened, by applying the *Apparatus*, the Operator must lay upon that Artery a tied Dozel dipt in Stiptic Water, and drive it towards the Outside. Afterwards he shall put into the Ring of the *Obliquus externus* Mr. *Petit's* Cushion dipt in a proper Medicament, and roll it a little in his Hands to squeeze the Liquor, that it may be somewhat oblong. He lays above it some Dozels, and fills the whole *Scrotum* with them, or with small Rags, and puts upon that whole *Apparatus* three or four graduated Compresses, which have a wonderful Effect. He makes an Embrocation upon the Belly, Groins, and the *Scrotum*; and then he covers the Belly with Compresses imbibed with the same, and lays upon them a large dry Compress, to fasten the Pins more easily. He raises the *Scrotum* with a Compress like a Suspensor, and keeps up the Whole with the following Bandage.

THE Bandage proper for the Operation of the complete *Hernia*, is the *Spica of the Groin*, which I have described for the *Bubonoccele*; only with

this Difference, that the Roller ought to be three or six Feet longer; and when the Surgeon has made the three Turnings of the Roller, which form the *Spica*, and turned over the Roller to cover the Compresses, and is descended to the internal Part of the Thigh to begin the Circulars about the Body, he ties the Roller with Pins in the Groin of the sick Side: Afterwards he conveys it to descend under the *Scrotum*, and ascend again to the opposite Groin, where he pins the Roller: He ascends again to pass in the same manner under the *Scrotum*, forming an Edging, and ties it in the Groin of the affected Side, to end with Circulars round the Body.

PHLEBOTOMY, Clysters, and a very strict Course of Diet, ought to be observed, as in the *Bubonocoele*.



CHAP. VIII.

Of the Operation of the EXOMPHALOS and ventral HERNIAS.

WHEN the Attempts for the Reduction of the Parts, that are come out, prove useless, and the Accidents continue very dangerous, the Operation ought to be performed: It consists in opening the Tumor, and reducing the Parts into the Belly.

ALL the Books advise us to make a longitudinal Incision upon the Tumor. Mr. *Petit* makes
a cru-

a crucial Incision with a strait and sharp *Bistouri*, the Blade of which is fastened to the Handle with a Fillet.

THE Surgeon pinches the Skin at first, if he can do it: If not, he makes a transverse Incision upon the whole Tumor, taking care to cut only the Skin, and a little of the Fat; and then he makes a longitudinal Section, whereby the Incision becomes crucial.

AFTERWARDS he turns back the four Angles of that Wound, and dilates it with his Fingers. In the next place, he perceives a Net, which is frequently mistaken for the Intestin: He must cut it with a crooked and sharp *Bistouri*, the Blade of which is fastened to the Handle with a Fillet. When he cuts the Net, he must use all the Caution and Care above-mentioned to cut the membranous Cells of the other *Hernias*, and tear the Net as much as he can.

As soon as he has destroyed it, he will perceive the Bag, which he must raise a little, to make a small Incision in it with a *Bistouri*, or Scissors.

Mr. *Arnaud* observes, that in those Sorts of Tumors, there is always some *Serum* in the Bag; which is a certain Sign that it has been opened. The same Advantage does not always happen in the *Bubonocèles*; for I have said that those Tumors were sometimes dry.

THE Operator conveys the fore or middle-Finger of his left-Hand into the Opening, which he has made in the Bag; and with the Help of that Finger he cuts it crucially with crooked and blunt Scissors.

WHEN the Surgeon opens the Bag, he may, according

according to the Doctrine and Experience of Mr. *Arnaud*, make a good or bad Prognostick about that Disease. For instance, if he perceives that the *Epiploon* is confined to the Circumference of the Ring, 'tis a good Sign, and he has good ground to believe the Patient will recover: Whereas if the *Epiploon* is come out into the Bag, without contracting any Adherence to the Ring, and is very much increased, as it generally happens, the Patient will be in a desperate Condition; for if the *Epiploon* be put again into the Belly, it will by its Weight press the Intestins very much, and occasion such Accidents as will put an end to the Patient's Life. If it be cut, the Accidents will be the same as those, which I have mentioned in the *Gastrorhaphy*. If the *Hernia* be old, and a great Portion of the Intestins is come out, the other *Viscera* having more Room in the Capacity of the *Abdomen*, will extend themselves, and fill up the Vacuity occasioned by the coming out of the Intestins. And if those Parts are put again into the Belly, their natural Place being taken up by the good Plight of the other Parts, all the *Viscera* will be so crowded, that the same Accidents will return soon after, and be quickly attended with Death, as it will appear by the following History.

Mr. *Arnaud* has seen *Exomphalos's* of several Figures, and some among others in Women, which took up a great Space, and were not unlike the Figure of a large Cheese. Those Women could not go to stool but by rubbing their Belly, and handling their Tumor a long time. It happened that one of them could not ease her self by that means; and the Suppression of the fecal Matters was attended with

with a violent Vomiting. Mr. *Arnaud* resolved upon the Operation: Having opened the Bag, he perceived in it a large Bulk of Intestins, and observing some Ligaments, he inferred that they were those of the *Colon*, which adhered to the upper part of the Tumor. The Reduction was well made; and though the Operation prov'd very successful, and the Surgeon had obtained whatever he could desire in such a Case, which was to make the Patient go to Stool, and put an end to the Vomiting, yet the Accidents began again, and the Patient died on the fifth Day.

It appears by this Observation, that my Consequence is grounded upon Reason and Experience.

To return to our Operation, the Surgeon must dissect and take off all the Adherences, observing the Circumstances so frequently mention'd by me, and remove all the Excrescences, if there are any, whether they be fat or fleshy. Lastly, he must put again the Parts into the Belly; but in order to it, he must destroy all the Adherences, which prevent their going in.

To that End, let him use Mr. *Petit's Bistouri*, which I have already mentioned several times, and exactly described, and let him convey it, without any Fear, perpendicularly into the Belly: Or else, let him use Mr. *Arnaud's* Method, which consists in putting the fore-Finger into the Ring, where generally the Inflammation is not so considerable as to prevent the Introduction of the Finger. Afterwards, the Surgeon, in order to cut that Ring, slides, with the Help of that Finger, crooked, blunt, and very large Scissors; for small Scissors could not cut the Teguments together with the Ring.

LASTLY,

LASTLY, if the Inflammation was so great, that the Surgeon could not introduce his Finger into the Ring, by reason of its being very much straitened, and if he had not Mr. *Petit's Bistouri*, he must dilate the Ring with the grooved Probe, and the crooked *Bistouri*, as I have said, when I discoursed of the *Gastrorhaphy*.

THE Question is to know, in what Part of the Circumference of the Ring that Dilatation ought to be made. Some modern Authors say nothing of it, and others prefer one Side to the other.

It ought not to be made on the right Side towards the Diaphragm, say some Authors; because the Operator would certainly cut the umbilical Vein, which reaches from the Ring to the Fissure of the Liver. It ought not to be made neither in descending towards the Groins; because the Surgeon would run the hazard of cutting the umbilical Artery, which proceeds from the external Iliack, and passes through the umbilical Ring. The Dilatation ought therefore to be made on the left Side, towards the Diaphragm; because in that Place there is no Part that can occasion any Disorder.

It seems to me, that an Objection is already raised against that Method, by saying that the umbilical Veins and Arteries, become, after the Birth of the Child, so many Ligaments, the Section whereof would not be very prejudicial to the Patient. (Tho' a modern Author affirms, that if the umbilical Vein was cut, the Liver would be no longer suspended, and that the *Vena cava* being compressed by it, and the Circulation of the Blood interrupted, Death would immediately follow.) That Objection is well grounded: Yet it may be said, that Nature does frequently vary,
espe-

especially in the Vessels, and that it may happen that the Vessels preserve their Course, and contain some Blood, as Mr. *le Dran*, Jun. sworn Surgeon of *Paris*, affirms he saw it in a Lady, who stirring herself somewhat hard, felt a Ruption in the Ring; and immediately he perceived an *Hemorrhage*: From whence the Surgeons inferred, it could only proceed from the umbilical Artery, which had preserved its Course, and contained some Blood.

THE Readers will more easily apprehend what I have just now said, when they know that Mr. *Du-verny* has publickly demonstrated that the umbilical Arteries do always preserve their Orifices to the Bottom of the Bladder, to which they afford several Branches.

IF the Bulk of that *Hernia* is not very great, the Operator may, as in all other *Hernias*, lay open the whole Bag, dilate the Ring, and make the Reduction without opening the Bag.

THE next Thing is to re-unite the Wound; which cannot be effected by following the Method to be found in Books; because all the Authors, with an unanimous Consent, advise us to put into the Ring a hard and long Tent, fastened to a Thread, to prevent, say they, the coming out of the Parts, and to give an Issue to the Matter. I have confuted that Argument, when I discoursed of the *Gastrorhaphy*, and shall only say in relation to the *Exomphalos*, that all the modern Practitioners disapprove the Scarifications in the Circumference of the Ring, prescribed in many Books, and wholly reject the Suture.

MR. *Petit* applies directly upon the Ring his Cushion, which must be fastened to a Thread;
and

and the next Day the Surgeon has much ado to draw it out, because it sticks both to the Angles of the Wound and the Ring; and when it is out, the opening of the Belly disappears. Afterwards he fills the Wound with small Rags and Dozels. He makes upon the Belly the Embrocation, which I have mentioned, speaking of the other *Hernias*. He covers the Dressing with three or four graduated Compresses, and keeps up the whole with the Napkin and Scapulary, which I have exactly described, discoursing of the Wounds of the *Abdomen*.

MR. *Arnaud*, and Mr. *Le Dran*, sworn Surgeon of *Paris*, heretofore Master of his Company, and Surgeon Major of the French Guards, performed the Operation of the Exomphalos upon a Person, who voided the fecal Matters through the Mouth, and some came out also through the *Anus*; which made the Operators believe that the *Hernia* was occasioned by the *Epiploon*. The Bag being opened, they found in the Ring a small Cell of the *Colon*; so that the Intestin not being wholly engaged in the *Hernia*, the Matters might still pass from time to time, and therefore they came out now and then through the *Anus*. But because they were sometimes heaped up in that Place, they were forced to ascend; which produced the Vomiting. And the Concussion of the whole Body, occasioned by that Vomiting, did so shake that Heap of Matters, that being compressed on all Sides, it was forced to pass downwards for some Time.

PHLEBOTOMY must not be neglected upon this Occasion: The Surgeon must prescribe frequent

quent Clysters, and a very strict Course of Diet, viz. good Broth, and some Spoonfuls of Jelly, if it be thought proper.

THE ventral *Hernias*, whether they be occasioned by the Relaxation or Rupture of some Fibers of the epigastrick Muscles, or succeed the Wounds of the *Abdomen*, require also the Operation, when the general Remedies and the *Taxis* prove ineffectual, and when Vomiting and the other Accidents continue.

To perform that Operation, the Surgeon brings the Patient to the Edge of the Bed, and having laid him down upon the Side opposite to the *Hernia*, he pinches the Skin upon the Tumor, and cuts it, as is practised in the other *Hernias*. Afterwards he lays open the whole Bag, dilates the Constriction, and reduces the Parts; and then he dresses the Wound.

A Shoemaker of *Paris*, whose Name was *Petit*, felt all of a sudden a very violent Pain under his Belly; and almost at the same Time he was troubled with a great Vomiting. His Surgeon knew the Disease, and perceived above the Arch of the crural Vessels a Tumor, not bigger than a small Nut, and very hard and painful. He said, it was a *Hernia*, and the Operation should be performed. The Patient and his Friends, being displeased with that Prescription, made their Application to a Quack, who slighted the Surgeon's Opinion, and advised an Emetick.

To put an End to those Differences, Mr. *Petit* was sent for: Having examined the Disease, he very much approved what the Surgeon had said, and performed the Operation.

HE made an Incision upon the Tumor, and laid open the whole Bag, without opening it. Afterwards he dilated the Constriction. The Wound was quickly re-united, and the Patient cured in five Days.

THE *Hernias*, which happen after a Wound, cannot be cured, as I have already said, by that excellent Way of operating, since those Sorts of Tumors have no Bag, it being very difficult to re-unite the *Peritonæum* after a Wound penetrating into the *Abdomen*; which has been confirmed a great many Times by opening dead Bodies. Wherefore, when a Surgeon is obliged to perform the Operation by reason of some dangerous Accidents, he ought to do it warily, and expect to find some Intestins under the Skin and the Flat.

HE must try all the Ways of making the Reduction by the *Taxis*, since the Operation is attended with a Relapse. Which way soever the Patient be cured, he must never be without a Bandage.



CHAP. IX.

Of the Dropsy in relation to the Paracentesis.

BY a *Dropsy* of the *Abdomen* we mean an extraordinary Tension of that Part, occasioned by Waters extravasated in its Cavity, and attended with a Swelling of the Legs and *Scrotum*.

EXPERIENCE

EXPERIENCE teaches us that crude and undigested Aliments, cold and acid Liquors, fix and coagulate the Blood to such a Degree, that the *Serum* separates from it, and produces a Dropsy. But because that Dropsy is general, and that which I am discoursing of in relation to the chirurgical Operations proper for the *Abdomen* or its Circumference, is particular; I shall enquire into the Causes of the Water gathered in the *Abdomen*.

IF the *Vena Cava* of a Dog be tied above the Iliack Veins, it appears that the Parts under the Ligature become dropfical. Therefore, the Dropsy in this Case is only occasioned, because the Blood of those Parts being stopped, the *Serum*, contained in that Liquor, separates from it, gathers in one Place, or is infiltrated in the fatty Cells, and produces that Disease.

AND indeed, all the learned Physicians, who have explained the Differences of that Disease, have found, by opening dead Bodies, some Tumors whereby the Veins were so compressed, that the Blood could not at all, or hardly, go farther. Wherefore, according to those Observations, the Dropsy of the *Abdomen* will happen, when some of its Parts, or *Viscera*, are swelled.

THE Blood being stopped in the Veins by the Compression of some swelled Parts, or *Viscera*, of the *Abdomen*, and not being able to continue its Course by reason of that Compression; it will necessarily very much dilate the Veins, wherein it is contained.

THE Veins being thus dilated, the several Fibers, which compose their Membranes, must needs recede from one another, and leave greater Intervals

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than usually ; whereby the Pores will grow wider, and let out the most fluid Particles of the Blood. Those Particles are commonly the *Serum*, which easily disentangles it self from the sulphurous Particles, when the Blood loses its Motion by any Course whatsoever.

THE *Serum*, passing through the Pores of the compressed Veins, imbibes it self in the Substance of the Parts from whence the capillary Veins return, and penetrates into them so as to fall into the Capacity of the *Abdomen*; or else, it infiltrates it self in the small Cells of the Fat, and in the Interstices of the Muscles ; which forms two Sorts of Dropsies ; the one called a *Dropsy by Effusion*, or *Ascites*, and the other a *Dropsy by Infiltration*.

AMONG the *Viscera* of the *Abdomen*, the Liver and the Spleen are most times swelled, especially the former ; because its Structure consists only of interlaced Veins, which have but a small Elasticity ; and consequently the Blood not having in that *Viscus* so swift a Motion as in the other Parts, it must needs obstruct that Part, and so compress the Veins, which bring the Blood back again. The Veins being compressed by the Obstruction and Swelling of the Liver or Spleen, the Blood stops in their Capillaries, their Ramifications become varicous, their Pores grow wider, as I have said ; the sulphurous Particles of the Blood being at rest, leave the *Serum*, which continually passing through the Pores of the Veins, gathers in the Cavity of the *Abdomen*, and occasions a Dropsy.

THE *Serum* running still through the Pores of the Veins, their Coats are at last very much relaxed, and their Pores so open, that the *Serum* flows

in great quantity; which cannot happen without its gathering in the *Abdomen*, &c. And because that *Serum* is not dissipated, for want of Heat and Motion in the Liquids, it gathers together to such a Degree, that it occasions a great Tension in the Belly, and forms an *Ascites*.

THE Accidents usually attending that Disease are very numerous. I could not mention, and give an Account of 'em all, without departing too much from my Subject; and therefore I shall content myself with explaining mechanically those that are most common.

THE Dropsy, formed as I just now said, is always attended with a very great Difficulty of breathing, which encreases after Meals, and when the Patients are a-bed. The Urine is muddy, and full of Gravel, and they void it in small Quantity, and with great Pain. They are troubled with a frequent and very dry Cough. They continually call for Drink, because they are very thirsty. They loath and hate all Sorts of Aliments; and sometimes they spit Blood in the Progress of that Disease.

THE Difficulty of breathing can proceed from no other Cause but this. The Waters lying in the Belly push the Diaphragm towards the Breast, and keep it from contracting; and the Diaphragm cannot lessen the Cavity of the Breast, without very much obstructing Respiration, &c.

THE Ventricle being full of Aliments after Meals, and situated in the Belly, 'tis plain it must stretch it self more still, and drive also the Diaphragm farther into the Breast. Therefore the Difficulty of breathing must encrease after Meals.

WHEN the Patients are a-bed, the Waters, that

are in the Belly, press upwards, as also downward; which drives the Diaphragm into the Breast, hinders it from contracting, and consequently encreases the Difficulty of breathing. And indeed those Patients are never easy but when they are sitting.

To make a great deal of Water, the Kidnies must filtrate a great deal of Urine. And because the Urine is only the *Serum* of the Blood, and we have seen that the Blood contains but little of it, since it loses it by its falling into the Belly, 'tis plain the Kidnies cannot filtrate a great deal; and consequently the Patient makes but little Water.

AND if the Transparency of Urine depends upon the great Quantity of *Serum*, which dilutes and divides the tartarous Salts, with which the Urine is clogged, it follows that the Urine of dropfical People, having but little *Serum*, can neither divide nor dilute the Salts contained in it. They unite therefore with one another; and the Urine of the Patient is muddy and full of Gravel.

IF sad Impressions and violent Irritations do frequently depend upon the Grossness of the Salts, 'tis plain the tartarous Salts of the Urine of dropfical People, being united for want of *Serum*, and having acquired a larger Bulk, must make such sharp Impressions, as they pass through the *Urethra*, that the Patients cannot but feel a smarting Pain, when they make Water.

SINCE the Blood affords to the different Glands the Matter of Filtration, it necessarily follows, that all the Recrements, which are naturally watery, are wanting in the Glands, that separate them from the Mass of Blood; for we have said that the Blood is almost intirely destitute of its *Serum*: Its
Salts,

Salts, not being diluted, unite together, and acquire a larger Bulk; which irritates the *Aspera Arteria*, and occasions a Cough.

BUT because the Blood does not afford the Lungs any *Serum*, to be cast up, the Cough of dropfical People must be very dry.

IF the Blood cannot afford to the different Re-crements any *Serum*, because it has none, as I have just now shewed; one may easily apprehend that the Spittle will be destitute of *Serum*, that its Salts will unite and grow larger, and making an Impression upon all the Parts of the Mouth, will excite a Sensation of Thirst; which is the Reason why dropfical People call continually for Drink.

ACCORDING to the same Principles, 'tis evident that the Salts of the *Saliva* being very gross, by reason of their Union, cannot penetrate the Aliments; and the Aliments, for want of being easily divided, fall almost intire into the Stomach; which occasions an Indigestion attended with a Loathing of all Sorts of Aliments.

IF Blood, as well as all other mixt Bodies, owes its Fluidity to the *Serum*; it plainly follows, that since the Blood of dropfical People has no *Serum*, it must needs grow very thick. A thick Blood, running with great Difficulty in its Vessels, stops in those Places, where it has less Motion. And because the Lungs are a soft Body, which receives its whole Motion from the Blood, without communicating any to that Fluid, 'tis plain the Blood must stop in the Lungs, and occasion a Spitting of Blood.

IF the *Serum* is infiltrated in the fatty small Cells, and in the Interstices of the Muscles, it

must needs relax their Fibers: Those Parts being swelled, lose their Elasticity, and consequently if they are pressed with the Finger, the Impression will remain in them.

WHAT I have just now said, leads us easily to the Knowledge of those Diseases; but because they require different Operations, and in different Places, according to the particular Difference of each Disease, I think it is highly necessary for a Surgeon to know the different Dropsies, which he undertakes to cure.

ACCORDING to the Principles I have laid down, it appears that there are two Sorts of Dropsies, one by *Effusion*, and the other by *Infiltration*.

AGAIN, there are two Sorts of Dropsies by *Effusion*. In the first, the Waters are diffused in the Cavity of the *Abdomen*, with all the *Viscera* contained in it. In the second, they are shut up in a particular Membrane, called by Surgeons a *Cystus* or *Bag*.

As for what concerns the second Sort of Dropsy, it is a *Serum* diffused, and infiltrated in the fatty small Cells, and in the Interstices of the Muscles; and because it is highly necessary for a Surgeon to distinguish all those Diseases, that he may safely perform the Operations proper for them, I shall mention the Signs peculiar to each Sort, agreeable to the Principles I have already laid down, and to daily Experience.

BESIDES all the Symptoms attending a Dropsy, which I have mentioned, and which are the true diagnostick Signs of it; when the Belly is much distended and swelled, and the Navel very much raised, there is ground to believe that it's a Dropsy by Effusion.

TO be the better convinced that there are Waters in the Capacity of the Belly, the following Sign ought to be added to those above mentioned. The Surgeon must put one of his Hands upon one of the Sides of the Belly, and the other on the opposite Side. The first Hand leaning upon the Side of the Belly must be at rest, whilst the other presses and shakes; and if the Surgeon feels a Waving of Water with the Hand that is at rest, he may be sure there is an Effusion in the Cavity of the Belly. But if he does not feel it, he may presume there is not a sufficient Quantity of Water diffused to perform the Operation, or that the Liquid is contained in a Bag.

MR. *Petit* affirms that the Wave or Column of Water, determined by the Hand that presses and shakes, is too extensive, and sometimes felt but confusedly; and therefore instead of the Concussions of the Hand in Motion, he advises the Use of Fillips, and says that the Columns of Water, determined by them, being less extensive than when the whole Hand is used, they are felt more distinctly.

LASTLY, if the Column of Water is felt but confusedly, and the Surgeon wants to know whether the Effusion is in the Cavity of the Belly, or in a Bag: Mr. *Arnaud*, in order to remove that Doubt, gives some Signs, which are almost undeniable.

The Urine, says that great Practitioner, in Dropsies by Effusion in the Capacity of the Abdomen, is defective either in Quantity, or in Quality. It is defective in Quantity, because it does not come out so plentifully as it uses to do. It is defec-

tive in Quality, because it comes out red, and leaves a Sediment somewhat like Brick-dust, which precipitates to the Bottom of the Vessel. I have given above the mechanical Reasons of those two Facts.

The quite contrary happens in those Dropsies, that are formed in a Bag: The Urine is clear, limpid, and as plentiful as usually. Besides, the Patient feels in that particular Dropsy, a dull Pain, a Heaviness, and as it were, a Stitch in that Part where the Bag lies: He felt them as soon as the Liquor of that Bag happened to be in a sufficient Quantity to occasion those Accidents, which must consequently encrease, as the Liquor encreases: Those Signs are a sufficient Presumption to make one believe that the Disease will end with a Suppuration.

LASTLY, the Dropsy by *Infiltration* may be known by a distended and swelled Belly, without feeling the Column of Water from one Side of the Belly to the other: The Skin is shining; and if it be pressed with the Finger, the Impression remains. But the most certain Sign is a sunk Navel, with an extraordinary Tension of the Belly.

HERE follows the Prognostick of the Dropsy. Since the Blood of dropfical People is very thick, and destitute of *Serum*, and since it circulates so slow, that it may occasion Obstructions in many Places; it ought to be inferred from thence, that Remedies will hardly be able to restore its former Fluidity. And if the Compression of the Vessels, occasioned by the Distention of the *Viscera* of the *Abdomen*, can only be removed by the Fluidity of the Blood, it follows that the Prognostick of that Disease must needs be very dangerous.

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THE Blood losing every Day Part of its *Serum*, and not receiving that Liquor, in proportion to the Aliments and Remedies, will at last grow so thick, that it will no longer be able to circulate in the Lungs, as I have already said; and compressing the Vesicles, or falling into their Cavity through some Laceration, it will prevent the Access of the Air; so that the Patient being no longer able to breath, must of necessity be stifled and die.

THE Blood having in time lost the greatest Part of its *Serum*, and leaving no Excrements in the Kidneys, no Urine will fall into the Bladder; and consequently there will be a Suppression of Urine.

THE Blood being very thick will stop in those Parts, that are farthest from the Center of Motion: It will ferment there, tear the Part, and occasion Ulcers attended with a Gangrene and Death.



CHAP. X.

Of the Operation of the Paracentesis, or Punction of the Belly.

I Have sufficiently enlarged upon the Causes of the Dropsy, its Differences, Accidents, diagnostic and prognostick Signs. I proceed to the chirurgical Operations proper for those Diseases.

As for what concerns the Dropsies by Effusion, whether the Waters be contained in the Cavity of the *Abdomen*, or in a particular *Cystus*, it is usual to void them by an Opening made upon the Tu-

mor with an Instrument called *Trois-quarts*, or for want of it, with a Lancet. But before the Surgeon begins that Operation, it will not be improper to put under the Loins of the Patient a Napkin folded into three according to its Length, and to lay on the Scapulary, that he may have no Occasion to make him stir, when he has drawn out the Waters.

It is usual to make the Patient sit upon his Bed, or upon a Chair before the Operation, that all the Waters may come out more easily, and he may breathe with less Difficulty.

THAT Situation appears to me inconsistent with the Design of the Operator. 'Tis true that the Trunk being in a perpendicular Situation, the Waters will go downwards; but those that are in the *Pelvis*, and below the Punction, cannot come out through the *Cannula* of the *Trois-quarts*, since no Compression can be made in the Circumference of the *Pelvis*, and consequently one Half of the Waters will remain in the Belly: And as the Water comes out, the Diaphragm will descend into the Belly; which will occasion fainting Fits.

THE best Way of situating the Patient is, according to the Practice of the *Hotel-dieu* at *Paris*, to make him lie upon his Bed, and, as Mr. *Petit* advises, to lay him down upon his Side, that all the Waters may be gathered in that Place, into which the Instrument is to be thrust; and by that Means the greatest Part of the Waters will come out. But before the Operator proceeds so far, he must ask the Patient, whether he felt some acute Pain before his Illness, and whether he be sensible of any Hardness either in the Liver, or the Spleen,

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and the Mesentery: For in this Case the Dropsy would be a Consequence of a *Scirrhus* in some of those Parts; and therefore the Punction should be made on the opposite Side, for fear the *Scirrhus* should hinder the Waters from coming out through the *Cannula*.

THE Surgeon must also take care not to make that Operation, when the Patient is troubled with a violent Cough; for besides that the Waters would not come out so easily, the Patient might be stifled.

AFTER a careful Observation of those Circumstances, the Surgeon must examine the Place, wherein the Punction is to be made. If we believe Authors, this Operation is to be performed in two different Places, *viz.* in the Navel, when it is very much protuberant, that all the Waters may come out, and four Inches above, or by the Side of the Navel, when it is level with the Belly.

I shall explain hereafter the sad Symptoms, which attend the Wounds of tendinous and aponeurotick Parts; but in order to confute the Opinion of those, who make the Punction in the Navel, when it is protuberant, we need only consider the diagnostick Signs of the *Ascites*, or Dropsy by Effusion, which are, as I have said, a distended Belly, and a protuberant Navel: So that the Protuberancy of the Navel being inseparable from the Dropsy by Effusion, and the Punction in the Place, which I shall mention by and by, lessening both the Protuberancy of the Navel, and the Tension of the Belly; it is not only a needless Thing to perform the Operation in the Navel, but also very prejudicial; because the Pains are very great in that Part, and the Cure difficult: Besides, the Weakness of the Navel, occasion'd by the Operation, is attended with a *Hernia*.

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THE second Place, wherein the Operation ought to be performed, according to those Authors, is about four Inches under or by the Side of the Navel, when it is level with the Belly, to avoid, as they say, piercing the *Linea alba*; because it would occasion a great Pain to the Patient.

IF the Operator follows this Method, he must pierce the *Musculus rectus* in the middle, and consequently its Sheath, which is very strong, and will occasion at least as much Pain as the *Linea alba*.

BESIDES, those aponeurotick Parts are not so easily reunited as the fleshy ones.

WHEREFORE to avoid all those Inconveniences, the Operator ought to measure the Distance between the Spine of the *Ili*a, and the Navel, and thrust his Instrument in the middle of that Space: In which Case, the Belly is so distended, that the *Cannula* happens sometimes to be eight Inches distant from the Navel.

THE Surgeon having observed the most proper Place to perform that Operation, shall make use of a Servant to compress the Belly with both his Hands, in order to bring the Waters into the Place, where the Punction is to be made, and remove the Intestins from the *Peritonæum*.

AFTERWARDS the Operator must examine his *Trois-quarts*, to know whether the Point be not rusty in the *Cannula*; that he may not be obliged to take off his Instrument, after he has introduced it into the Belly; because the Blade could not be separated from its *Cannula*.

IN the next place, the Operator dips the Point of his Instrument in Oil, holding fast the Handle in the Palm of his Hand, and the *Trois-quarts* armed with its

its *Cannula* between the fore and middle-Fingers : And then he brings the Instrument near the Place, wherein he is resolved to make the Punction, and thrusts it somewhat obliquely into the Belly, to direct the Column of Water towards the Vessel into which it must fall, and which lies upon the Ground. Or, to do better still, he must hold a Vessel in his Hand ; and when it is full, he must put another under the Opening, whilst he empties the first into that which lies upon the Ground.

I have just now said, that the Operator must bring his Instrument near the Place, wherein he designs to make the Punction ; not to imitate those Surgeons, who bring it all of a sudden, and with Violence, as if they were to overcome an invincible Obstacle. Such a Method is too blunt and hasty ; and one of the Perfections of a Surgeon is to operate gracefully. He must drive in the *Trois-quarts*, till he meets with no Resistance ; which is a certain Sign that it is got into the Cavity of the Belly. The Operator needs not be afraid of any thing : The Waters in an *Ascites* remove the *Peritonæum* at a considerable Distance from the Intestins. He must only take care not to drive the Instrument upon some Veins, which are generally very apparent and very much distended by the Thickness of the Blood and the Slowness of the Circulation ; not because he fears an Hemorrhagy, but because some Drops of Blood gush out, which are unacceptable to the Standers-by, and some small Ulcers happen, which are laid to the Charge of the Surgeon.

IF the Waters do not come out immediately after the thrusting of the Instrument, though the Operator be convinced of the Existence of those Waters
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by all the Signs above-mentioned ; he ought not to be uneasy upon that account, and the Patient's Friends need not be frightened. That Fault proceeds only from the Shortness and Smallness of the Instrument ; and therefore the Surgeon shall take a longer and bigger one, and make another Punction two or three Inches under the first.

As the Waters come out, the Servant shall press the Belly, and the Operator must do the same in some Places, to force the Waters into the *Cannula*, that they may run out more easily, and to bring nearer the epigastric Muscles, and all the internal Parts, which are at a great Distance one from another, by reason of the coming out of the Water ; which would be attended with great Accidents, were it not for this Caution, as I shall say hereafter.

It happens sometimes, that after a certain Quantity of Water is drawn off, it stops all of a sudden. That Interruption proceeds only from a Body stopping the *Cannula*, such as the *Epiploon*, or the Intestins. In this Case, the Operator introduces into the *Cannula* a Silver Stilet with a Button at the end, and drives away those Parts, that stop the Passage of the Water.

THE Patient must neither stir, nor cough, during the Operation ; and therefore one must take care to apply some warm Napkins upon his Feet and Belly, and other Parts uncovered, that he may not be troubled with Cold.

OUR Authors generally advise to empty the Waters at several Times, in order to preserve the Strength of the Patient, and prevent his falling into a Swoon. 'Tis true, that Symptom is very dangerous, and some Persons have not recover'd of it. But many learned Surgeons

Surgeons acknowledge that this Accident proceeded only from the Patient's Difficulty of breathing, occasioned by the Inaction of the epigastric Muscles, which being extraordinarily distended, lost their Spring, and consequently could no longer counter-balance their Antagonists.

WHEREFORE to help those Muscles, and restore to 'em what the Overflowing made them lose, we take care to press the Belly during the Operation, in order to bring them nearer the *Viscera*, and give them again their natural Tension. For the same reason Mr. *Arnaud* will have the Belly to be bound tight with a Napkin; and that expert Surgeon assures us, that many Patients have been preserv'd by that Means.

SINCE those mechanical Reasons, and Experiments frequently repeated, discover to us the true Cause of the *Syncope*, and teach us how it may be prevented, we need not scruple to draw out all the Water at the first Punction: This I have seen done above twenty times in the *Hotel-Dieu* at *Paris*, without any Accident arising from it.

THE Operation being over, the Surgeon takes off the *Cannula*, and applies upon the Opening large Compresses dipt in warm Brandy, and over them some Napkins folded into several Doubles, also imbib'd with Brandy: The Whole must be kept up by the Napkin, which must be well fastened with the Scapulary.

THE Patient must take some Nourishment, and some spirituous Liquor to strengthen him. The Surgeon must come two or three Hours after to straiten again the Napkin, which grows loose as the *Viscera* and Muscles resume their natural Place.

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WHEN the Operator has evacuated the Waters, and the Belly is altogether sunk, he may touch the Liver, the Spleen, &c. and examine whether there is any *Scirrhus*. In which Case the Patient may be sure of a Relapse, unless it be prevented by Aperitives, Diuretics, Sudorifics, and Purgatives, which must be prescribed by an experienced Physician.

IT being usual for Country Surgeons to be at a great Distance from their Houses, and to find in desert Places some Patients, who want to be relieved by them; I shall give the Method of performing that Operation with a Lancet for want of the *Trois-quarts*.

WHEN the Surgeon has done every thing above-mention'd before the Operation with the *Trois-quarts*, he must take a common Lancet, the Blade whereof is fastened to the Scale with a Fillet, and thrust it into the Belly, in the Place which I have assigned.

IF we consider that, which way soever the Belly be opened, the Fibers of the internal and external oblique Muscles are cut, because they cross one another, the Surgeon need not be tender of them, but thrust his Lancet transversely, that the transverse Muscle be only divided according to the Length and Direction of its Fibers.

SOME Authors, such as *Fabricius ab Aquapendente*, and after him Mr. *Dionis*, affirm that the Water running a long time thro' that Opening, makes the Cure of it more difficult; and therefore they will have only the Skin and the Fat to be pierced at first; and then they get it drawn downwards or upwards to pierce the Muscles, that the Wound of the

Skin

Skin be not parallel with that of the Muscles, and be sooner reunited. This Accident might very well happen in their way of operating ; because they emptied the Belly only at five or six several times ; and because they left a great deal of Water, for fear the Patient should fall into a *Syncope*, the Water had a free Passage thro' the Wound. Besides, the Opening of the Skin not being parallel with that of the Muscles, the *Serum* meeting with an Obstacle, infiltrated in the Fat, and consequently prevented a speedy Reunion.

BUT as I have shewed by the Mechanism of the Part, and by Experience, that the *Syncope* is not occasion'd by the whole Evacuation of the Water, and therefore we do not scruple to empty it altogether ; 'tis plain that when there is but little or no Water, it cannot come out through the Wound : Which is the Reason why we use no more Precautions to pierce the Skin and Muscle with a Lancet, than with the *Trois-quarts*.

THE Lancet being in the Belly, when the Surgeon depresses it a little, and sees the Water come out, he introduces into the Belly a Silver Stilet, having a Button at the end, and that Stilet serves as a Conductor to a silver or leaden *Cannula*.

WHEN all the Waters are evacuated, the Operator must apply the Dressing, which will not be so mysterious as that which is mentioned in Books. He must use the Plaister of *Andreas a Cruce*, open in the Middle, to reunite the Division speedily : He must lay upon the Wound a small Linnen-Compress dipt in Brandy, and above it a larger one ; and lastly three or four other Compresses, and upon the whole Belly some Napkins folded and dipt in warm Brandy,

Brandy, the tight Bandage, and the Scapulary, as I have said.

THIS Method of operating is longer and more difficult than the first; and therefore it ought not to be used but in Case of Necessity.

BESIDES the Dropsies which are occasioned by an Effusion, and overflow all the Inside of the *Abdomen*, there are some, which appear in its Circumference, and take up only certain Places in it. These Dropsies are contained between the *Peritonæum* and the Muscles, or in the Interval of the two Membranes of the *Peritonæum*; which makes a particular Bag, called *Cistus* by the Operators; and therefore those Diseases go by the Name of *incisted* Dropsies.

THE Liquor of this Sort of Tumors, remaining a long time, is the Reason why the *Cistus* thickens considerably, and sometimes grows hard and callos. The Extent of those Tumors, as I have said, is confined to certain Parts of the Circumference of the Belly, and appears outwardly with different Figures, according to the different Places, wherein that Collection is made: But those Effusions generally end in a Point; and by this Sign, jointly with the others, they ought to be distinguish'd from the Dropsies diffused through the whole Capacity of the *Abdomen*.

THE Operation of this Sort of Dropsies differs not from those, which I have just now described; only the Surgeon ought to know, by the Situation of the *Cistus*, which is the most proper Place to thrust the *Trois-quarts*; and that Situation will sometimes move him to make a larger Opening.

THE Liquor contained in the *Cystis*, and felt by the Touch, being always thick, the Operator must use a *Trois-quarts* of a greater Diameter, and longer than those that are used to bring out the Waters contained in the whole Cavity of the *Abdomen*.

IF the Surgeon, after the Operation, is fully persuaded that there is a *Cystis*, and if the Matter has contracted some bad Quality; Mr. *Arnaud* advises the Operator to syringe some Injections into it, till they come out again as clear as they were at first; but Care ought to be taken not to leave them in it. This Practice, far from being dangerous, is very wholesome; for it has been observed in those, who died of that Disease, that the Parts of the *Abdomen* do not appear till the Bag, which forms the *Cystis*, be removed.

Mr. *Arnaud* has performed many of those Operations, and found very thick Matters, and of different Colours: Some were whitish, and others being settled grew of a Coffee-colour, and changed into *Pus*. Lastly, he saw a Woman, who had a very great Tumor in the upper Region of the *Abdomen*; and Part of it was under the Cartilages of the false Ribs: He perceived by the Touch that there was some Liquor, either Water, Chyle, or Bile, diffused into a *Cystis*. The Patient confirmed him in that Opinion; for she said, that she felt a dull Pain, a Heaviness, and, as it were, a Stitch in that Part where the *Cystis* was, and that all those Accidents had happened, as soon as there had been a sufficient Quantity of Liquor in the *Cystis* to occasion them; that they had increased as the Liquor grew more copious, and the Tumor bigger. The Surgeon being informed of the Nature of the Disease by all those

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Signs, proposed the Punction ; but the Patient, and her Relations, were against it. The other Remedies proving ineffectual, and the Pains increasing, the Patient resolved upon the Punction: Mr. *Arnaud*, with the Advice and in the Presence of Dr. *Lemery*, of the Faculty of *Paris*, and Member of the *Royal Academy of Sciences*, drew off seven or eight Pints of a yellow Liquor, which being settled, did not change its Colour : It was like a gross and thick Bile. The Patient was perfectly cured.

Mr. *Petit* performed that Operation five and twenty times for an incysted Dropsy ; and the Patient perfectly recovered.

THERE is, among the chirurgical Operations of Mr. *de la Vauguion* and Mr. *Verduc*, a singular Observation, which they ascribe to *Blasius*. “ That
 “ Author, *say they*, tells us that he saw a considera-
 “ ble Swelling in the lower Belly of a Woman,
 “ which some took to be a Mole and a Tympany.
 “ She lived three Years in that miserable Condition :
 “ Her Belly was as hard as a Stone. At last, she
 “ died of Weakness, and when he opened the dead
 “ Body, he found that the Skin, the Muscles, and
 “ the *Peritonæum* made but one and the same Body,
 “ wherein no Muscles could be distinguished. All
 “ those Parts, the Thickness whereof does not fre-
 “ quently exceed one Inch in their natural state,
 “ were above half an Ell thick from the Navel in-
 “ to the Belly. The Out-side of the Belly was
 “ wholly cartilaginous, and the In-side towards the
 “ *Peritonæum* was cancerous.”

I have seen a Lady, who came to *Paris* to consult the Surgeons about a great Tumor, with which she had been troubled for the space of two Years.

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That Tumor was in the lower part of the *Abdomen*, from the Navel to the *Pubes*. It ended like a Point, and resembled a great Belly of nine Months: That Lady thought she was with Child the first Year of her Indisposition. Her Belly was as hard as a Stone; and she had never felt any Pain: She went away without using any Remedies. I think this Disease was like that, which is mentioned by *Blasius*.

HAVING sufficiently explain'd the Operations proper for Dropsies by Effusion, either in the whole Cavity of the Body, or in some particular *Cystus*, I shall end this Chapter with the Operations to be performed in Dropsies by Infiltration.

SURGERY affords us three different Operations for this Sort of Diseases, *viz.* the potential Cautery, or the *Seton*, Blistering, and Scarifications. I shall speak of the two first Methods in another Place.

IF there was a Dropsy by Infiltration in the secret Parts of Men or Women, they must be scarifi'd. In Men the Scarifications are made upon the *Penis*, not deeper than the Skin; and in Women, on the sides of the Lips, and pretty deep; because there is a great deal of Fat in those Parts.

IF the Dropsy by Infiltration is in the Belly, as also in the Thighs and Legs, Scarifications must be made in the Legs, but never without the Advice of experienced Physicians and Surgeons; for if some Persons are cured of that Disease, a great many die of it.

WHEN the Physician has prescribed Scarifications, the Operator, to avoid being blamed, must tell the Patient, and his Friends, who expect to see a great deal of Water come out, that nothing but Blood will appear, and that the Water will come afterwards.

THE most proper Place to make those Operations, according to Mr. *Arnaud*, is the internal and middle Part of the Leg, one upon each Side. The Surgeon performs them of the Length of the small Finger : He only opens the Sin and the fat Body, and does not go so far as the Muscles.

THE best Medicament, that can be put upon those Scarifications, is the *Nuremberg*-Plaister, with many Holes in it to let out the Waters. And if those Scarifications grow dry afterwards, before the Disease be cured, and it be thought proper to make new ones, they ought not to be made on the same Side, but in the external Part of the Leg, and one in each Leg, as before.

THE Surgeon does not make the second Scarifications in the internal Part ; because the Waters, on that Side, being evacuated, all that Side is very much lessened. Besides, if the second Scarifications were made in the same Place as the first, or in the adjacent Part, the Humours being always discharged through the same Part, might be troublesome ; but if they are made on the other Side of the Leg, the Waters of the external Part come out, and are easily evacuated.



CHAP. XI.

Of the HYDROCELE.

THE *Hydrocele* is a Collection of Waters in the *Scrotum* ; and therefore it has been called a Dropsy of that Part. This Disease, as well as the Dropsy

Dropfy of the *Abdomen*, of which it is frequently a Consequence, proceeds from the same Causes; and therefore I need not enlarge upon it. I shall only observe, that the *Hydrocele* may happen after a Blow upon the *Scrotum*, or after a Fall, which compressing the spermatick Vessels, &c. occasion in that Part an Inflammation, whereby the Blood stopping in the Veins, distends them.

THE spermatick Veins cannot be distended by the Blood stopped in them, without compressing the lymphatick Vessels; so that the Lymph of those small Tubes, being obstructed in its Course, will occasion the Separation of the *Serum*, which being imbibed in the Texture of the Tunicks, will relax them more and more, and make them so thin, that their Pores being more opened will give a Passage to the Lignor contained in them: This will produce an *Hydrocele*, of which there are two Sorts, one by Infiltration, and the other by Effusion.

CHILDREN are more subject to *Hydroceles* than grown People; and even some Children come into the World with Waters in the *Scrotum*. The *Hydrocele* by Infiltration is more common among Children than the other.

THIS last Disease may easily be known; because it takes up only the common Membranes of the Testicle, which are the *Scrotum* and the *Dartos*; and the Water being infiltrated in the fatty small Cells lying under the Skin of that Part, and in the Interval of the Fibers of the *Dartos*, distends the Skin so much, that no Wrinkle is to be seen in it; that Skin is smooth and shining; and if a Candle be brought near the Tumor, one may see a Transparency not unlike that of a Bottle of Water.

THE Surgeon knows also that 'tis an *Hydrocele* by Infiltration, when he examines the *Penis*, which in that Case never grows lesser: On the contrary, its Membranes are sometimes so infiltrated with the same Liquor, that when the Disease is great, the *Penis* swells prodigiously; one may perceive in it the same Transparence as in the *Scrotum*; the *Glans* it self is much swelled by the Constriction of a *Periphi-mosis*, which the Skin forms in it. The last diagnostick Sign is, that the Patient suffers great Pains; and it appears by the Touch that 'tis Water.

IF the *Penis* is as much distended as the *Scrotum*, when the Disease is great, 'tis because the Skin, and Fat of the *Penis*, tho' never so little, are the Continuities of those of the *Scrotum*; and the latter being infiltrated by the *Serum*, the others must be so too.

IT is not so with the *Hydrocele* by Effusion; there are several Sorts of it, and its diagnostick Signs are very different.

Mr. *Petit* takes notice of three different Sorts of *Hydrocele*, two of which are contained in the *Tunica vaginalis*, and the Muscle called *Cremaster*. The first reaches from the Ring to one Inch above the Testicle: In the second, wherein the Partition, which I shall mention by-and-by, is forced, the Effusion is about the Testicle: So that in the first Sort of that Disease, the Testicle is not confounded in the Tumor; but in the second, it is mixed with the Waters.

IN order to give a just Notion of those two Sorts of Dropsies by Effusion, let us consider the Structure of the Parts wherein they are to be found.

THE *Tunica vaginalis*; a Membrane peculiar to the Testicle, is composed by the internal Membrane of the *Peritonæum*, which forms in that Place a Production, which passing through the Openings of the epigastrick Muscles, surrounds the spermatick Vessels an Inch above the Testicle. There it has some Adherences to the *Epididymis*, and they form a Kind of Partition, whereby the Testicles are debarred from any Communication with the Belly, and then it surrounds the Testicle.

To be fully convinced of this Truth, one must make with a Scalpel a small Incision in that Tunick, above the *Epididymis*, and blow with a Pipe, and it will distend it self from the Ring to the *Epididymis*, without any Particle of Air passing about the Testicle.

ON the contrary, if that Experiment be made upon the Testicle, the *Tunica vaginalis*, formed by the same Production of the *Peritonæum*, will be distended, and there will be some Air round the Testicle, but none will pass above it.

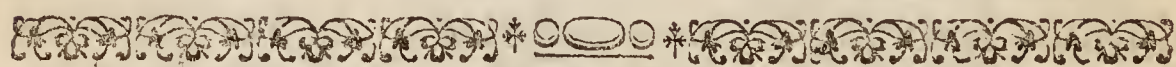
THIS Description shews, that the Water being diffused into the *Tunica vaginalis*, makes there an *Hydrocele* of the first Kind, since it is confined to the Adherences of the *Epididymis*; and consequently the Production of the external Membrane of the *Peritonæum* will make the Bag or *Cystis* of the *Hydrocele*, in which the Testicle will not be found.

BUT if the Water is in great Quantity, or is grown acrimonious, it will force the Partition, and diffuse it self in the Circumference of the Testicle; whereby one may know the second Sort of *Hydrocele*, in which the Testicle will be confounded with the Waters in the *Cystis*.

LASTLY, the third Sort of *Hydrocele* by Effusion is, when the Waters are diffused into the whole *Scrotum*.

THE diagnostick Signs of those Sorts of Dropsies differ from that which is by Infiltration in several Respects. The Tumor is not smooth, and does not appear transparent : The *Scrotum* is not so distended, and there remain some Wrinkles in it, but fewer in the third Sort of Dropsy than in the two first; for the latter being contained in a particular *Cystis*, which grows harder and thicker, as the Water has been longer in it, the Folds of the Skin do not disappear but when their Cover has acquired a considerable Bulk.

AGAIN, the *Hydrocele* by Effusion may be distinguished from that which is by Infiltration, because in the former the *Penis* is not distended; on the contrary, the more the Disease increases, the more it seems to shrink into the Belly, and the *Hydrocele* being at its Height, the *Penis* is so shrunk, that it resembles a Navel.



CHAP. XII.

Of the Operation of the Hydrocele.

IF the *Hydrocele* is a Consequence of the Dropsy of the *Abdomen*, it were in-vain to try any Remedy or any Operation, before the Waters of the *Abdomen* are evacuated: But if the Disease be only in the *Scrotum*, it may be cured, either by Medicaments, or chirurgical Operations.

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THE Cure, attempted by Medicaments, does sometimes succeed, especially when the Waters are not in great Quantity, and the Patient is young, and of a good Constitution: And there is a Necessity to use that Method, when there is an *Erysipelas* in the *Scrotum*.

EVERY body knows that the best Remedy for this last Accident is a frequent Phlebotomy; especially if the *Erysipelas* be attended with a Fever. Topicks will relax the Skin, and consequently lessen the Inflammation; and therefore emollient Fomentations are used with good Success; such, for instance, as are made with the Water of Morel, Mallows, and Marsh-Mallows; softening Cataplasms, &c. However those Remedies will not be very successful, unless the *Scrotum* be kept up with a *Suspensorium*, because its Weight draws it downwards, and makes it very painful.

WHEN there is no *Erysipelas*, the Surgeon must use a Fomentation made with Melilot, Camomil, &c. boiled in red Wine; and as soon as he takes it from the Fire, he must put as much Brandy into the Decoction, and bathe the *Scrotum* with the Liquor very warm, laying upon it some Compresses dipt in the same Medicament, the whole being kept up by a *Suspensorium*.

SOME use Desiccatives, such as equal Parts of Lime-water and Brandy, a little warm, and applied upon the *Scrotum*, in the same Manner as the foregoing Remedy. All those Remedies frequently succeed, especially in the *Hydrocele* by Infiltration: But it must not be at its Height; for if there was a *Phimosis*, or a *Periphimosis* threatening with a Gangrene, the Surgeon must immediately

ately make some Scarifications upon the *Penis*, as I shall say, when I come to describe that Operation.

THOSE Scarifications must not go deeper than the Skin: Some ought also to be made upon the *Scrotum*. One may sometimes make two Incisions in it, one on each Side, pretty long, and not penetrating the Teguments, which are then very thick, though they seem to be very thin. This Method, practiced by Mr. *Arnaud*, is very speedy; but the Surgeon must be sure that there will be no Gangrene. Afterwards he foment the Part with camphorated Brandy, and covers it with Compresses dipt in the same Liquor.

IT ought to be observed that all those different Operations must not be performed for the *Hydrocele* by Infiltration, when the *Scrotum* is affected with an *Erysipelas*: On the contrary, the Surgeon in that Case should use the Remedies, which I have already prescribed, and put off the Operation till that Accident is over.

IF the *Hydrocele* is made by an Effusion, all those different Remedies will avail but little, unless it be in the third Sort, when the Water is contained in the *Scrotum*: Those Remedies may then be tried: But to cure the two first Sorts, there is an absolute Necessity to perform the Operation with a *Trois-quarts*, larger or lesser, according to the Size of the Patient. As for Children, one must have a small one made on purpose.

IF the Disease be only on one Side, the first thing the Surgeon ought to mind, before he performs the Operation, is to observe where the Testicle lies; that he may not compress it, when
he

he compresses the Tumor, with a Design to gather the Waters, in order to facilitate the Operation.

IN the next Place the Surgeon must proceed to the Operation; and to succeed in it, I must make several Observations. First, the Operator ought carefully to mind these two things: The one consists in piercing the Tumor with a *Trois-quarts*, without wounding the Testicle or the spermatick Vessels; for it would be attended with a *Varix* or Aneurism by Effusion, as Mr. *Arnaud* has seen it: The second thing is to bring out the Waters through the *Cannula*.

THE Operator must therefore examine, whether he can distinguish the Testicle; which he may easily do, if the *Hydrocele* by Effusion is of the first Sort, as I have plainly made it appear by the Theory of those Diseases. If he cannot distinguish the Testicle, he may infer from thence that it is confounded with the Waters in the *Cystis*. The Surgeon, in such a Case, ought to have a right Notion of the Situation of those Parts, by virtue of his Skill in Anatomy.

IT is well known that the *Scrotum* is divided by a fleshy Partition, and that both Testicles adhere, on each Side, to the lower Part of that Partition. Wherefore, to avoid pricking the Testicle, or the spermatick Vessels, the Operator shall compress the Tumor with the Thumb and fore-finger of the left Hand, that he may gather the Waters in the external Part of that Tumor; and taking with the right Hand a *Trois-quarts* armed with its *Cannula*, he shall convey the Point of the Instrument obliquely upwards into the Middle Part
of

of the *Scrotum*, and on the Side opposite to the internal Part of the Thigh, taking care to remove always the Point of the Instrument from the spermatick Vessels.

To succeed in the second thing just now mentioned, the Surgeon must take the *Trois-quarts* out of the *Cannula*, to let the Waters come out; and if the Water be evacuated, and none of it remains, he must take off the *Cannula*, and apply upon the *Scrotum* some Compresses dipt in warm Brandy, the whole being kept up with a *Suspensorium*. But when a certain Quantity of Water is come out, if the Surgeon perceives there is still a Tumor, 'tis a certain Sign that there is a *Cystis*, which forms a double Dropfy; which is the reason why it frequently happens that no Water comes out by the first Punction. In this Case, the Tumor ought to be pierced with the *Trois-quarts* in the same Manner I have already said, and with the same Caution.

MR. *Arnaud* performed that Operation upon a Man, and after he had brought out as much Water as possible, the Tumor was only half lessened; from whence he inferred that there was a double *Hydrocele*; and without losing any Time, he pierced the second Tumor with the *Trois-quarts*, and evacuated it intirely. That Tumor was higher than the other.

FIVE or six Months after, that Man came to Mr. *Arnaud*, to have the same Operation performed again; and the Tumor, being pierced with the *Trois-quarts*, vanished away intirely, contrary to the Expectation of the Operator, who took it to be double.

TO explain this *Phænomenon*, one need only consider the Structure of the *Tunica Vaginalis*, which I have described in the foregoing Chapter; and it will plainly appear that the Acrimony of the Water, or its Weight, had removed the Adherence of that Tunick to the *Epididymis*, which forms the Partition above mentioned, and that it was only a very large Bag.

SOME are for a *Seton*; but it is only proper for *Hydroceles* by Infiltration, or at most for the third Kind by Effusion; and in this the Punction is safer, quicker, and less painful.

IF the Surgeon goes about that Operation, he does not convey, as the Ancients would have it, a Skain of Cotton from one Side of the *Scrotum* to the other; for besides that he would create a great Pain, he would certainly pierce the spermatick Vessels, or the Testicles: But he uses a large triangular Needle, through the Eye of which he passes the Cotton; afterwards he pinches the Skin on the external Side, and in the lower Part of the *Scrotum*, and passes the Needle through the Teguments, leaving in them the Cotton, which he draws from time to time; and the Water discharges by the Orifices.

IF the Surgeon used the Skain in the two first Sorts of *Hydrocele* by Effusion, the Testicle or the spermatick Vessels lying open, would rub against that extraneous Body; and then an Inflammation, and the Accidents that attend it, would quickly happen: Wherefore I always prefer the Use of the *Trois-quarts*.

THE Surgeon ought to mind in a particular Manner the Water, that comes out through the
Cannula

Cannula of the *Trois-quarts*. If it be clear and limpid, he must advise the Patient to have the same Operation frequently performed, in order to prevent the stagnating of the Waters, which always does a great deal of Mischief. On the contrary, if it be muddy and stinking, he must inform the Patient the Tumor ought to be quickly opened. The same Prognostick ought to be made, when the Waters have been a long time in the *Scrotum*; and the sooner the Tumor is quite opened, the better it is.

It happens also sometimes, when the Waters are evacuated through the *Cannula*, that there comes out some Blood, or Water very much tinged with Blood. In such a Case, the Operator, according to Mr. *Petit's* Advice, must without any further Hesitation open the whole *Scrotum*, and look for the opened Vessel to make a Ligature in it.

MOST Authors tells us that this Operation may be performed two Ways, either with the cutting Instrument, or the potential Cautery; but they are generally more inclined to use the Cautery, because, say they, it makes a large Escar, and consumes by degrees the Members, which must be melted by the Suppuration; and the Operator runs no Hazard of wounding the Testicle, as when he uses the Lancet.

OTHERS, knowing better the Virtue of that Remedy, affirm that when a Number of Causticks has been applied on the Tumor, and they have produced their Effect, the Escar must be opened with a Lancet.

I am against using the Cautery, for four Reasons, which appear to me plausible. First, every body
knows

knows that the Cautery works very slowly ; and that in the mean time, the Liquid which we suppose already to be corrupt, will become so more and more. Secondly, the Effect of the Caustick cannot be limited, since it operates sometimes beyond what the Surgeon designed to consume. Thirdly, though the Cautery be applied, there is still a Necessity of opening the Escar ; and since an Opening ought to be made, it is better to use at first the cutting Instrument. Fourthly, in order to lay aside the potential Cautery, I affirm, we know by Experience, that being dissolved and mixed with the Waters in the *Hydrocele*, it makes them caustick, and that afterwards they occasion a great Disorder.

I shall therefore give the Preference to the cutting Instrument, but not to the Lancet ; for in all those Tumors, wherein some Parts are to be used tenderly, the Lancet is an Instrument, whose Point cannot be directed by the Eye ; and when it is thrust in, it cuts whatever it finds in its way.

PERHAPS it will be said that a good Operator perceives when he cuts something, and consequently that he may use a Lancet : But I answer, that he perceives too late that he has touched a Part, when it is already wounded.

WHEREFORE, I am for a strait *Bistouri* ; and to perform the Operation well, the Surgeon must pinch the Skin in the upper Part of the Tumor, which is commonly about the Root of the *Penis*. His Servant must do the same ; and both of them together raising the Skin and the Fat, the Operator shall cut it with the strait *Bistouri*.

As soon as he has made this first Incision, he sees and opens the Bag, and perceives by the Moistness that he is got into its Cavity. Afterwards he slides a Finger into the Opening of the Bag, and conveys upon that Finger blunt Scissars, to open the Tumor on its Side, and in its whole Length.

It happens sometimes that after he has opened the Tumor, he sees no Testicle; and if in this Case he was ignorant of the Structure of those Parts, as I have shew'd above, and should infer from the Hardness of the Membranes, that they ought to be cut and consumed, he would run the Hazard of damaging the Testicle. On the contrary, if the Testicle be confounded with the Waters, the Tumor is hardly opened but it appears; and if the spermatick Vessels be distended, they ought not to be cut immediately. That Accident frequently proceeds from no other Cause but because the Waters, that are in the Bag, and in the Circumference of the Testicle, weighing a great deal, and drawing the Testicle downwards, the Vessels are compressed by the Angle occasioned by the Sinuosity of the Bones of the *Pubes*, into which they pass; so that the Blood not being able to ascend again, the Veins are dilated, and become varicous.

It is therefore the Part of a prudent Surgeon in this Case to examine carefully the State of the spermatick Vessels, and to follow Mr. *Petit's* Advice, who says, They ought not to be cut the first Day, unless the Operator feels an extraordinary Hardness and Callosity in them; but when the Waters, or the Matters are evacuated, and the *Scrotum* eased, the Blood may resume its Course, and the Distention at last disappear.

IF the Membranes of the Bag are hard and callous; the Surgeon must cut as much of them as he can, and put upon the Remainder some Causticks, such as the *Red Precipitate*, or *calcinated Alum* mixed together, to make an Eschar that will excite a Suppuration; and by that Means the remaining Part of the Membranes will waste and suppurate. Lastly, if he can tear and take off the Bag, he shall make a Ligature in it, and cut it underneath.

Mr. *Arnaud* takes Notice, that there is sometimes in the *Hydrocele* a fat Body, which ought to be cut and wasted by Causticks and Suppuration.

THERE is frequently an Abscess in the *Tunica vaginalis*. When the Operator is convinced of it by the Signs of the *Pus* that is forming, and by the Existence of a Liquid, he must open the Tumor with the Caution above-mentioned, and make a sufficient Opening to discover the Bag. He also pinches the Bag, taking care not to mix any Parts with it, and opens it. Afterwards he introduces into it the fore and middle-Fingers of his left-Hand; and upon those two Fingers he opens and cuts with blunt Scissars the Tumor and the *Scrotum* in its whole Extent.

IF the Testicle be confounded in the Bag, he plainly sees it, when the Tumor is opened: He must then touch it, and examine whether he does not feel upon it a Fluctuation, which is a Sign of *Pus*, Water, or some other Liquid. The Castration should then be performed, if we believe most Authors; but before the Surgeon proceeds to such an Extremity, he must examine the *Epididymis*, and see whether it be not damaged; and if it be found, he must with a Lancet open the Abscess of the Te-

sticle, in its whole Length, and make it suppurate: And if he perceives no Callosity after the Suppuration, it's a certain Proof of the Cure of the Disease; but if there was a Callosity, it must be extirpated.

Mr. *Arnaud* performed that Operation in the same manner I have described it, and with very good Success. He saw another Case much of the same Nature. The Testicle was very much swelled, and when he touched it, he perceived a Liquid immediately. He pierced the Testicle with a small *Trois-quarts*, like that which is used for Children, and there came out a yellow and clammy Water. The Patient was perfectly cured.

THE Dressing of those Diseases being the same as that of the Castration, I shall discourse of it in the next Chapter.



C H A P. XIII.

Of the Castration, in relation to those Diseases, which require that Operation.

THE Function of the Testicles consists in separating from the Mass of Blood that Liquid, by which Men are propagated; and therefore a Surgeon, who ought to be prudent in all his Operations, must in a particular Manner endeavour to cure the Diseases incident to those Parts, without being obliged to destroy them. The Examples, which I have alledged in the fore-going Chapter,

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ter, plainly shew, that the Diseases of the Testicles may frequently be cured, without a Castration. It is more glorious for the Surgeon, and more advantageous to the Patient, to perform the Cure without cutting off the Part.

IN former Times, Surgeons would not have scrupled to tie the spermatick Vessels, when distended, in opening an *Hydrocele*. An Abscess in the Testicle, or an Effusion of some Liquid in its Substance, would have determined an Operator to perform the Castration speedily. But now being acquainted, by Mr. *Petit's* Discoveries, with the usual Causes of the first Accident, and grounded upon Mr. *Arnaud's* Experiments, who has many times opened the Abscesses of the Testicle, and used the *Trois-quarts*, to take out, with very good Success, the Liquid contained in its Tunicks; we cure the Patient most times, in both Cases, without having Recourse to that cruel Operation.

HOWEVER, I don't pretend to reject it altogether: In some Cases it is not only necessary, but even the only Remedy. What I mean is only this, that a Surgeon ought never to bring Matters to that Extremity, till he has tried whatever our Art teaches us, and whatever his Experience and Genius may suggest to him, in order to avoid that Operation. But if notwithstanding all his Care to preserve the distended Vessels, after he has opened an *Hydrocele*, and if having tried all possible Remedies to dissipate its Swelling, and to soften it, the Hardness and Tension continue two or three Days after the opening of the Tumor, he must proceed to the Operation.

CASTRATION is also the only Remedy, when the Surgeon having opened an Abscess in the Testicle, and having made it suppurate, and applied upon it the most dissolving Plaisters, it remains still hard and callous. That Operation is also performed, when the Membranes of the Testicles are hard and callous, without having been separated before by Waters, Pus, &c. for it appears from thence, that the spermatick Vessels, and the Testicle, are also affected with the same Disease, or that they cannot be separated from their Membranes, which are the *Cremaster*, and the *Tunica vaginalis*.

It frequently happens by a Blow upon the *Scrotum*, or by a Fall, that the Testicle is inflamed, distended, and hard, and occasions a Pain, a Fever, and many other Accidents. In such a Case, the Patient must be blooded copiously, and emollient Poultices applied upon the *Scrotum*.

THAT Disease happens also in Claps ill cured, or that fall into the *Scrotum*. The same Remedies will cure it; and if any Hardness remains still, the Surgeon endeavours to remove it with a small Friction of mercurial Ointment; which must be done before a small Fire, and upon the *Scrotum*. Mr. *Dionis* says, he has often succeeded with the following Plaister.

Take Emplast. Diaboton. divin. de Ran, cum Mercur. equal Parts, which you shall dissolve in Oil of Lillies; and then spread that Plaister upon a Piece of Leather to lay it on the Testicles. Mr. *Arnaud* adds to that Mixture Part of the *Nuremberg*-Plaister, which is a very good Dissolvent.

THOSE different Diseases frequently occasion cancerous Tumors, or Excrescences of a white Flesh, which

which proceeds either from the very Body of the Testicle, or from its Membranes. They are distinguished from *Hernias*; because they don't happen all of a sudden, as *Hernias* do; because they are not attended with the same Symptoms; because they are hard, rugged, and uneven; and because *Hernias*, on the contrary, are even and smooth.

THE Remedies just now mentioned, have frequently succeeded in like Cases: They ought to be used a long time, and often reiterated. The Operator must not neglect Phlebotomy, Purgatives, Dissolvents, and many other Remedies, which shall be prescrib'd by experienced Physicians and Surgeons.

IF all those Attempts prove ineffectual, and the Excrescence increases instead of lessening, the Operator must open the *Scrotum*, and see whether the Figure of the Testicle be not altered, or fastened to its Membranes; whether the spermatick Vessels be not callous, and the *Epididymis* taken up by the fleshy Mass. In such a Case, the Surgeon might hope for a Cure, by cutting that Excrescence, or using a proper Consumptive, and end with the Suppuration. But if the Testicle, or the spermatick Vessels have lost their natural Figure, and the fleshy Mass seems to proceed from those very Parts, the Tumor and the Testicle must immediately be extirpated.

LASTLY, if the Testicle is so bruised, either by a Blow or a Fall, that a Gangrene is a necessary Consequence, the Surgeon must not put off the Castration, which will be more or less successful, according to the Greatness of the Disease. For if the Vessels of the Testicle were hard, and callous even beyond the Ring of the *Obliquus externus*, the Operation would

not be successful, and the Disease reaching the Belly in a very short time, the Patient would not live long; and therefore the most expert Surgeons are against the Operation in such a Case.

ON the contrary, if the Patient was a Man of a good Constitution; if the Distention and Hardness of the spermatick Vessels did not reach beyond the Ring of the *Obliquus externus*; if the Putrefaction or Gangrene did not reach so far neither, and if the Cause of the Disease was external; the Operation would be the only Remedy, and might be attended with a good Success.



CHAP. XIV.

Of the Operation of the Castration.

AFTER the Use of general Remedies, if the Disease allows Time enough for it, the Patient must lie on his Back; and some Servants must hold his Arms and Legs. The Operator makes then an Incision in the *Scrotum*, which he begins near the *Penis*, and directly above the spermatick Vessels, taking care to avoid them; and therefore somebody must draw the Testicle a little, whilst the Surgeon cuts the Skin, to remove it from the Instrument.

IN order to make that Incision, he shall use a strait *Bistouri*, and pinch the Skin in the elected Place, jointly with a Servant; or he shall begin the Incision in that Part of the *Scrotum*, which appears the thinnest; being always mindful to cut at first nothing but the Skin.

AFTER-

AFTERWARDS the Operator shall thrust the fore or middle Finger under the Skin into the fat Membrane, to get into the *Scrotum* ; and he shall enlarge the Incision, by cutting upon his Finger, with blunt Scissars, the Skin separated from the Fat, and by that means open the whole *Scrotum*.

IN the next place, if the spermatick Vessels make a large Bulk, and there is ground to suspect a *Hernia*, the Surgeon shall pinch the Bag in that Part, which appears the thinnest, and open it likewise upon his Fingers in its whole Extent ; which may easily be done, if there be never so little *Serum*. But if there are any Intestins in it, and if the Disease lies on the right Side, Care ought to be taken not to tie the Appendix of the *Cæcum* ; which would occasion new and sad Accidents.

IF the *Epiploon* is also come out, and grown hard and large, as it generally happens, the Operator, before he ties and cuts it, must see whether it does not contain some Circumvolution of Intestine. This is not a vain Observation. Mr. *Thibaut* has seen an Instance of it ; and he would have cut the *Epiploon*, had it not been for this Caution.

THE next thing is to cut the internal Part of the Ring of the *Obliquus externus*, and then to separate the spermatick Vessels in that Place, before the Testicle be touched, and to tie them close to the Rings of the Muscles, or a little above them.

IF those different Methods appear extraordinary, they are nevertheless safe, and justified by the Practice of Mr. *Arnaud*, that excellent Practitioner, who affirms they succeed better than all the others ; because the Ring of the *Obliquus externus* compressing the spermatick Vessels no longer (since we

have cut it, and we suppose the spermatick Vessels to be tied a little above it) there happens no Inflammation in those Parts; an Accident, which occasions the Death of one half of the Patients, by reason of the Symptoms with which it is attended.

To make the Ligature, the Surgeon must use a Fillet more or less thick, and such as I have described, speaking of Sutures. He must pass it under the spermatick Vessels, putting about it a small Compress somewhat long and narrow: He must tie them and the Compress in the fore-mentioned Place, and straiten it very fast with a single Knot: Lastly, he must make a second Turn, and keep it fast with a double Knot, and above it a single Knot.

BEFORE the Surgeon proceeds farther, he must do the same to the Bag, I mean, separate it with his Fingers in that Part of the *Scrotum*: Afterwards he must make a Ligature in it, like the foregoing, and separate with his Fingers both the Bag and the Testicle from the rest of the *Scrotum*, cutting with Scissars those Parts, that make too great a Resistance. This Method is not only safer, since the Surgeon does not run the Hazard of occasioning a great *Hemorrhage*, but it prevents also very much the Patient's Pain, because the Parts are insensible below the Ligature.

HAVING thus separated the Bag and the Testicle from the *Scrotum*, and cut the hard and carcinomatous Bodies, which made a Resistance, the Operator cuts the Bag an Inch below the Ligature, and the spermatick Vessels four Inches underneath, that he may have a Hold, in order to make a second
Ligature,

Ligature, if the first should unhappily grow loose, or was not sufficiently straitened.

IF this Operation was performed for a gangrened, rotten, or crushed Testicle, or for some Excrescences raised upon it; in a Word, if there was no *Hernia*, Abscess, or Dropsy in the *Tunica Vaginalis*, the Surgeon, after he has opened the *Scrotum*, and viewed the Testicle, must separate the spermatick Vessels with his Fingers, at the Rings of the Muscle, as I have already said: He must also cut them, and make a Ligature in the spermatick Vessels, and separate the Testicle, the Membranes, &c.

IT happens sometimes that the spermatick Vessels, and Membranes, are more bulky than before, because all the Vessels are varicous. If upon such Occasions, the Ligature was only made about the spermatick Vessels, as I have just now said, it would grow loose, when the Suppuration lessens its great Bulk, and the Artery might emit some Blood; which would make the Cure more difficult.

TO prevent that Accident, the Surgeon passes a small Fillet of three or four waxed Threads into the Eye of a Needle, and pierces the spermatick Vessels in the Middle with the Needle. Afterwards he applies a long and narrow Compress on each Side of the Part that is pierced: He makes a single Knot upon each Compress, because it is more binding than a double one; and to make an End of the Ligature, he turns the Fillet two or three times round, one or two Lines above the pierced Part, the better to stop the Blood; and he fastens all those Turnings with a double Knot, and
cuts

cuts the Thread at half a Foot distance from the Part that is tied ; which I have not observed yet.

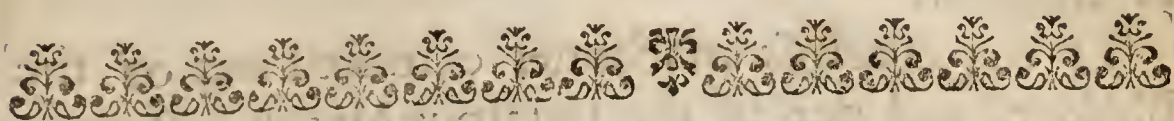
WHEN the Surgeon performs those Operations, he must always have a great many Slips of Rags, that he may wipe the Blood, and know from whence it proceeds. For instance, in the Partition which divides the *Scrotum*, there is a small Artery, which creeps into the *Dartos*, and makes half a Circle : It frequently emits a great deal of Blood, which the Surgeon must wipe, and secure the Opening of the Vessel, to make a Ligature.

AFTER all those Operations, if the Surgeon perceives that the Angles of the *Scrotum* are too large and inconvenient, he cuts them, and afterwards dresses the Wound, in the following Manner.

FIRST, he raises the spermatick Vessels, to put under 'em some Pieces of fine and worn out Linnen, which Mr. *Arnaud* and Mr. *Petit* prefer to Lint. He also puts some on the Sides of the same Vessels, and upon them. Lastly, he surrounds them with Linnen-Rags, and fills the Wound with them, laying upon the whole Dressing graduated Compresses, to restrain the Violence of the Blood, and prevent the Hemorrhage. He fastens the whole Dressing with the *Spica* of the Groin described above, when I spoke of the *Bubonocèle* ; and he must add the Convolutions, as in the compleat *Hernia*, taking Care to bend the Thigh on the Side of the Illness, before he begins that Bandage.

THOSE Patients do frequently wet the whole Dressing by voiding Urine ; which occasions an Irritation, an Itching, and an *Erysipelas*. To prevent that Inconvenience, the Surgeon puts over
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the whole Dressing a *Suspensorium* of waxed Cloth, pierced in its upper Part, to let through the *Penis*.



CHAP. XV.

Of the Stone in the Bladder, in relation to Lithotomy.

I Shall define the *Stone* an extraneous, hard, and brittle Body, of different Figures, according to the various Disposition of the Parts of which it is composed, and the different Places wherein it grows, and formed of Saline and gross Particles, united together with Sulphur.

SURGEONS and Anatomists have found Stones in most Parts of the Body; and Mr. *Petit* has lately extracted above a hundred and twenty from the lower *Punctum Lacrymale* of a Lady.

To give a right Notion of Petrification in general, I should take Notice of many Observations to be found in Books; but because the Operation I am to speak off, concerns only those Stones that are formed in the Bladder, or fall into it from the Kidneys, I shall only discourse of the latter, and I shall do it as briefly as I can.

THE chymical *Analysis* of Stones extracted out of the Bladder, and of the tartarous Matter to be found at the Bottom of Chamber-pots, having each of them by it self a much greater Quantity of urinous Salt than of Sulphur; it has been inferred from

from thence with great Probability, that the Origin of Stones was nothing else but a Collection and Union of those tartarous Salts with a Mixture of Sulphur.

IF the *Analysis* of Stones extracted out of the Bladder, and out of the tartarous Matter just now mentioned, affords a greater Quantity of Salts than of Sulphur, and if the Collection of those Principles is the Cause of Stones, and of the tartarous Matter, it follows that those same Principles are to be found in the Urine, and that their Collection occasions what the learned Mr. *Chirac*, chief Physician to his Royal Highness the Duke of *Orleans*, and Surveyor of the King's Garden, calls a calculous Concretion.

BUT because that Union can only be made, according as the Principles of the calculous Concretion happen to be near one another, and because they cannot be separated, it follows that whatever is able to deprive the Urine of the volatile Salts, which put it into Motion, and keep its Principles asunder, will very much contribute to unite the saline and urinous Salts, and the Sulphur, which I have laid down as the Principles of the calculous Concretion. This will happen, either by the Dissipation of the volatile Salts, which proceeds from the Agitation of the whole Mass of Blood, from a violent Exercise, a plentiful Sweat, &c; or because the Blood is not sufficiently furnished with those volatile Salts, either by reason of the coarse, terrestrial and sulphurous Nourishment we take, or by reason of the Grossness of the Air we breathe. Wherefore those who live upon a coarse and terrestrial Food, who drink acid Wines,

Wines, and inhabit watry and marshy Places, where the Air is thick, will be more subject to calculous Concretions.

It appears from what has been said, that the Urine being clogged with gross and terrestrial Salts, and a certain Quantity of Sulphur, and those Principles being not kept asunder by the volatile Salts, which are wanting in the Urine or in the Blood; I say, it appears that those gross and tartarous Salts will be united with the small Quantity of Sulphur, and form a small Body, which we have called a Concretion.

THAT small hard Body, or that calculous Concretion, is sufficient to be the Center and Foundation of the largest Stones; and whether it be formed in the Kidneys, in the Ureters, or in some Corner of the Bladder, other sandy Concretions will stick to the former; and from that Collection there will arise a Body more or less hard, according to the greater or lesser Quantity of the Phlegm, which will lessen or encrease the Hardness of that Body.

THAT small Body, called by Lithotomists the Kernel of the Stone, being formed at first in very small Places, such as the Kidneys, the Ureters, or the Folds of the Bladder, it follows that its several Concretions must have continually been pressed by the Parts surrounding it; and consequently more closely united; from whence proceeds a small Stone, which is the Kernel of the large ones.

WHEN that Kernel is large enough to dilate the small Cavity, wherein it has been formed, whether it be in the Kidneys, or in the other Places above mentioned, 'tis plain it will compress the Blood-Vessels that surround it, and stop the Blood;
from

from whence will arise small *Phlogoses*, which will quickly be attended with an Inflammation. That Inflammation will repell the Spirits into the Brain, and they will immediately run into the Part; and all those Alterations will occasion a Pain.

IF the Pain is a Consequence of the Irritations, 'tis plain there will be an Irritation in that Part, which contains the small Kernel; and because that Irritation occasions several Concussions, the Kernel must needs be forced out of its original Place; and if it be in the Kidneys, the repeated Concussions will make it fall into the Ureter, the Bladder, &c. where the urinous Salts and Sulphurs of the Urine will again form small Concretions, which being united to that Kernel by Degrees, will at last make up a Stone of a very large Size.

AND because the Stone being then in a more spacious Cavity, is not so constrained, and the calculous Concretions superadded to it are not pressed so hard as they were, when the Kernel was formed, the succeeding Petrification upon the Kernel will not be quite so hard, which is confirmed by Experience; for when a Stone is broke, the Kernel appears to have a Covering of a different Colour and Substance from the rest of the Stone.

I have already said, that the Hardness of stony Concretions depends upon a lesser or greater Quantity of Phlegm to be found in the Urine; so that if there is a sufficient Quantity to keep the tartarous Salts in a kind of Dissolution, the stony Concretions being soft and porous, their Union will only produce a porous and soft Body, that will be crushed in Pieces with the least Violence. On the contrary, if the Urine wants Phlegm, the Sulphur

will

will unite the Salts more closely ; and the Concretions, arising from the Union, being smaller and closer, the Stone will be more compact and smooth.

THE Figures and Differences of Stones may be explained by the Phlegm, by the different Disposition of the stony Concretions, and their different Motion in the Bladder. Some are round, others long, oval, flat, &c. Some are smooth, others uneven, and rugged ; which is the Reason why they have been called Mulberry-like Stones.

HANING explained, as briefly as I could, the Formation of the Stone, and discoursed of the several Alterations, which happen to it in its Growth, I proceed now to the Signs, whereby one may know that the Stone is in the Bladder.

THE diagnostick Signs of the Stone in the Bladder are a considerable Pain in its Neck, and that Pain increasing, when the Urine is evacuated. An Itching in the *Perinæum*, which reaches all along the *Penis* to the Extremity of the *Glans* ; and therefore the Patients sometimes draw it so much, that it grows extraordinary large and long. They complain of a Heaviness in the *Pubes*. They can only void their Urine Drop by Drop. They have sometimes a total Suppression of Urine, which is over, when they lie upon their Backs. They are frequently subject to an Erection, a *Tenesmus*, and a Weariness. They void sometimes a slimy Matter. Their Urine is sometimes bloody, and sometimes clear.

THO' those Signs seem to prove that there is a Stone in the Bladder, yet they are often very deceitful, and may sometimes proceed from a particular Disease of the Bladder or Kidnies without
any

any Stone. But the most certain Sign is the Introduction of the *Catheter* into the Bladder. I shall teach the manner of performing that Operation, as well as I can (for it is very difficult to give certain and infallible Rules for sounding) and I shall speak of the Benefit arising from the *Catheter*, when I have explained the Accidents attending the Stone in the Bladder.

It being very proper not only to know the diagnostick Signs of a Disease, but also to explain by a sensible Mechanism the different Causes of those Signs, I shall say that the Stone in the Bladder being a hard and heavy Body, it will press the Parts on which it lies. That Pressure will stop the Course of the Blood, Lymph, and Spirits. The two former being kept in the Part, that is pressed, or in its Circumference, will distend it, and occasion an Irritation. The latter being stopped in their Course will flow back into the Brain; and that Reflux being often repeated will increase, and the Irritations, occasioned by a Collection of Blood and Lymph, will be the Cause of very great Irritations attended with Pain. Such is the Explication of the Pains in the Neck of the Bladder.

WHILST there is a great deal of Urine in the Bladder, the Stone will not press so hard that Part to which it sticks; because the Urine raising it by degrees, bears up a considerable Part of its Weight; but when the Urine is voided, the Weight of the Stone being no longer kept up by the Waters, will lie altogether upon the Bladder; from whence will arise what I have explained above. Therefore the Pain occasioned by the Stone will increase, when the Patient ceases to make Water.

THE Irritations in the Neck of the Bladder contracting its *Sphincter*, it follows that the Veins of that Part of the *Urethra* will be compressed by it, and that the Blood of the spongy Texture of the Glans and *Urethra* (which is but one and the same Continuity, as we know by Injections,) will not be able to discharge into the Veins. It must therefore remain in the spongy Texture of the *Glans* and *Urethra*, and distend their Membranes. The more the Membranes are distended, like the Strings of a Violin, the more they are susceptible of Vibrations. Those Vibrations drawing the Spirits plentifully into that Part, and the Nerves of the *Urethra* being, as it were, constringed, will excite a Kind of Numness or Itching all along the *Urethra*, which will move the Patient to rub the *Penis*, in hopes of driving away the Pain. And because the *Urethra* passes under the Arch of the *Pubes*, and reaches the Extremity of the *Penis*, I may very well say, that the Itching will be felt in the *Raphe*, and all along the *Penis*.

THOSE who have handled the Scalpel, have observed that the Bladder does not float in the *Abdomen* with most of the *Viscera* contained in it; but they have found that it lies between the two Folds of the *Peritonæum*, and that it adheres a little to those Membranes, whereof the external adheres to the *Pubes*. Now if we suppose a Stone in the Bladder, it will always, whatever Situation it may be in, draw that Part of the Bladder, which adheres to the *Pubes* by means of the *Peritonæum*, and will make the Patient feel a Heaviness in that Place.

IN order to void Urine plentifully, the Urine ought to meet with no Hindrance in the *Urethra*: and if the Stone happens to be at the internal Orifice of the *Urethra*, as it generally does, it will only let out some Drops of Urine. And because all the Parts are distended upon that Occasion, and the Urine passing Drop by Drop occasions an Irritation by reason of the excessive Pain, the Patient will be obliged to quit the Urinal, and to take two or three Turns in his Chamber, in order to ease himself. But because the Weight of the Waters makes him very uneasy, he will take it again to void some other Drops with the same Difficulty.

IF the Stone stops the Passage altogether, not one Drop will come out; but the Patient lying upon his Back, the Stone will roll towards the Bottom of the Bladder; and then the Passage of the *Urethra* being free, the Patient will easily pass his Water.

SINCE the Stone compresses the Orifice of the Bladder, the Veins that bring back the Blood, will be affected by that Compression. The Blood will therefore run in greater Quantity into their Cells; and the Irritations of all those Parts drawing a greater Quantity of Spirits into the *Erectores Penis*, they will contract; which will still more compress the Veins, that bring back the Blood of the *Penis*, and by that means will occasion an Erection.

THE hinder Part of the *Penis* resting upon the *Rectum*, 'tis plain the Stone, in some Situations, will strive to go that way. Such an Effort will press the Veins of the *Rectum*, and prevent the Return of the Blood contained in them. When this happens, that Intestine must needs be distended by the Quantity of the Blood, that is in its Vessels;
and

and growing more sensible by such a Distention, the intestinal Juice, or the Excrements, will occasion some Irritations in it, which will excite a continual Desire of going to Stool, attended with an Inability of doing any thing. This we call a *Tenesmus*.

THE Stone striking every Moment against the internal Surface of the Bladder, those Shocks will draw in a greater Quantity of Spirits, whereby its Fibers will be contracted. And the Glands being compressed by it, the Humour filtrated by 'em will fall into the Bladder in greater Plenty, and come out with the Urine, like a slimy Matter.

IF the Stone be uneven and rugged, it will sometimes open Blood-vessels by rolling in the Bladder; and then the Blood falling into the Bladder, and being mixed with the Urine, the Patient will make bloody Water.

THE sandy Concretions adhering still to the Stone, and the Glands not having secreted their Liquor more than usually, nor the Blood-vessels afforded any Blood in the Bladder, the Urine will be, as it were, filtrated, and come out very clear.



CHAP. XVI.

Of the Method of sounding, in Relation to the Diseases of the Bladder.

THREE essential Circumstances oblige us to probe the Patient. The first, to let out the Urine retained in the Bladder, as a Consequence

Of some of its Diseases. The second, to know whether there be any Stone; and the third, to be informed of the Condition the Bladder is in.

IN order to probe in those three Circumstances, Surgeons make use of longer or shorter, bigger or lesser *Catheters*, according to the different Age of the Patients; but they are always of the same Figure: They are bent in half their Length, and the other Part is strait. There are also *Catheters* like a half Bow, without any Part of them strait. This latter Sort of Probe was made on purpose for the Patients, that they may probe themselves; and the former is used by Surgeons.

SINCE we probe, in the first Circumstance, for a Retention of Urine, it will not be improper to enquire into the Causes of that Retention.

THE Urine cannot come out of the Bladder, either by reason of the Relaxation of its *Sphincter*, or because it is too much compressed. The first Cause proceeds from a Palsy; and the second from the Distention of the spongy Texture of the *Urethra*, the Vessels whereof become *varicous*.

WHEN a Surgeon probes a Patient for a Retention of Urine, occasioned by the Relaxation of the *Urethra*, he always feels something, which keeps the Probe from getting into the Bladder; and therefore Surgeons have said, that there are some *Carnosities* or Scars in the *Urethra* which prevent the coming out of the Urine.

Mr. *Arnaud* maintains, that there are neither *Carnosities*, nor Scars; and Mr. *Petit*, who is of the same Opinion, says, he has opened several Persons, who should have been affected with those pretended *Carnosities*; and yet the Inside of the *Urethra* was very smooth.

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WHAT is it then (will it be said) that keeps the Urine from passing ; and what Obstacle does the Surgeon feel with the Probe ?

THE spongiuous Body of the *Urethra* being distended, as Mr. *Petit* says, and its Vessels being so too, it follows that they will take up more Room than usually ; and by reason of those *varicous* Vessels, the *Urethra* will appear bigger outwardly, whilst its Cavity is very much straitened by the same Distention of the Vessels : This is the Obstacle, which the Surgeon feels with the Probe. And because the Tension of all those Vessels occasions an Irritation, the Spirits will plentifully come into them, and contract the *Sphincter* ; which will prevent the coming out of the Urine.

ACCORDING to this Explication, the Way of curing the Suppression of Urine, as a Consequence of the Distention of the spongiuous Body of the *Urethra*, is to compress the Vessels, in order to force the Blood contained in them to circulate with the Mass. This is very well effected with *Bougies*, Probes, and sometimes pyramidal Compresses applied upon the *Perinæum*, in the membranous Part of the *Urethra*. The Vessels being compressed, the Urine comes out easily and plentifully.

BUT if the Probe, which I have just now described, be made use of, it will occasion some Accidents, which will prove the more dangerous, because they are not minded. First, the End of the usual Probes being very long, when they are introduced into the Bladder, it will pass above its Orifice about two or three Inches ; so that the Urine being come as far as the Openings, that are on the Sides of the usual Probes, no more will come out ;

and the Stream of Urine, which comes out thro' the Pipe of the Probe, stopping all of a sudden, the Surgeon will be apt to fancy that there is no more Urine left in the Bladder, though there is some remaining still to the Height of two or three Inches; and if the Urine has contracted an ill Quality in the Bladder, that which remains in it, being thicker and more muddy, will irritate and corrode that Membrane, and occasion in it small Ulcers attended with sad Consequences.

IN order to avoid that Fault, which has not been minded hitherto, Mr. *Petit* has invented a Probe of a very ingenious Structure. Its Bending is very small, without any Shoulder, and its End, which is not one Inch strait, makes an end of the Bending. That Probe being introduced into the Bladder, does not reach half an Inch beyond its Neck; so that by raising a little the Rings of the Probe, and depressing them, one may get out all the Urine.

THIS is not the only Advantage of that new Probe: It differs also from others, first, because the usual Probes let in the Urine into their Pipes thro' two small Openings, which they have on their Sides at their End. According to the Description I have given of the spongy Contexture of the distended Body of the *Urethra*, it ought to be considered that those Probes being introduced into the Canal of the *Urethra*, which is straitened by the Distension of its spongy Contexture, it will press against the Probe, and finding two small Openings upon the Sides, it will get into them. As soon as that spongy Contexture is in the Cavity of the Probe thro' the small Openings, it will dilate
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like a Sponge, which after having passed through a narrow Space, happens to be in a larger Place. And if the Surgeon at that very Moment drives the Probe to make it go into the Bladder, or if he takes it out, one may easily apprehend that if those Motions are made with any Swiftmess, the spongy Texture, which is engaged in the Probe, will be torn, and a great Quantity of Blood will come out, as I have often observed.

To this may be added, that after having thus opened the spongy Texture of the *Urethra*, with respect to the Openings of the usual Probe, the Irritations will be more violent; and the Spirits flowing more plentifully into that Part, the Distention will be more considerable: So that if the Surgeon tries a second time to introduce the Probe into the Bladder, he will meet with a greater Opposition; and if he undertakes never so little to remove that Obstacle, he will introduce the End of the Probe into the Opening, that was made in the spongy Texture of the *Urethra*, the first time the Patient was probed, and by that means he will open a new Way, which will afford a great deal of Blood, &c.

THE new Probe does not occasion such Accidents; because it has no Opening on the Sides, into which the spongy Texture of the *Urethra* can enter, and its Extremity is shut up with a small pyramidal Eminence, to be found at the end of its Stilet. But because the Stilet must remain in the Probe, when it is introduced into the Bladder, and because it prevents the making of Injections, (but does not hinder the slimy Matter from coming out, as some Surgeons say;

for that Matter, and even Clods of Blood come out,) Mr. *Petit* has contrived another Probe, which is introduced without any Opening in it; and when it is in the Bladder, there remains no Stilet, and the Waters come out plentifully. All that I can say about that Probe, is, that I made use of it several times, and always introduced it into the Bladder with great Ease.

IN order to probe a Patient, he must sit upon the Edge of a Chair, and lean upon the Back of it: Or else, he must lie in his Bed, his Knees being somewhat raised, and his Thighs kept asunder. Afterwards the Surgeon takes with his right-Hand a Probe dipt in Oil, that it may the better slip in. Some say, the Operator must hold the Probe in that Part where the Rings are, between his Thumb and fore-Finger. Others will have him to hold it with all his Fingers. Lastly, some say it ought to be applied upon the Tuberosity of the Thumb and the fore-Finger, in the same manner as one holds a Conductor. All those Methods are arbitrary, and each of them is approved by some Surgeons.

THE Operator holding the Probe with his right-Hand, shall take with the left the *Penis*, and hold it up between his Thumb and his fore and middle-Finger. But before he puts the Probe into the *Urethra*, he must consider that there are three Things which hinder its Introduction into the Bladder. The first is the Opening of the *Glans*. The second is that Part where the *Urethra* bends to pass under the Arch of the *Pubes*. The third is the Bulbæ of the *Urethra*, or that Part where the *Veramontanum*, or the *Caruncula* lies, as Mr. *Duverney* says, which being distended by the Inflammation, as well as the
Sphincter

Sphincter of the Bladder, make a Resistance to the Probe.

IN order to overcome the first Obstacle, the Surgeon must uncover the *Glans*, and then he introduces the End of the Probe into the Opening of the *Urethra*, and holding the *Penis* somewhat distended, he conveys the Probe (the Convexity of the Bending being towards the *Pubes*) to the Beginning of the Arch of the *Pubes*. When the Operator comes to that Part, the second Obstacle hinders him from going farther; but to overcome it, he makes half a Turn with the Probe, that the Cavity of its Bending may pass under the *Pubes*, and be adapted to the Winding of the *Urethra*. In order to make that half Turn methodically, he gently conveys the Probe and the *Penis* towards the Groin, that is farther from him, taking Care that the End of the Probe remain in the same Place, and be, as it were, the Center of the half Turn. All Lithotomists are very careful to distend the *Penis*, when they make that half Turn; but Mr. *Petit* considering the Structure of the Part, says that if the *Penis* be distended upon such an Occasion, the Coats of the *Urethra* will be brought near one another; whereby the Probe will not have a free Passage. Wherefore, he leaves the *Penis* loose; and the Probe slips easily under the Arch of the *Pubes*. We are not come yet into the Bladder: We must remove the third Obstacle. In order to it, the Surgeon must let down a little his right Hand, to raise the End of the Probe; and if this be not sufficient, he gently feels on the Right and on the Left to find the Orifice of the Bladder. Lastly, he conveys the fore
and

and middle Fingers of his left Hand under the *Scrotum*, or into the *Anus*, that he may introduce the End of the Probe into the Bladder.

ONE would think from what has been said, that now there is nothing so easy as probing; but I can affirm that though all the Precepts I have laid down, are prescribed by the most experienced Surgeons, and though they are right, yet as often as I probed, I found some Differences, and did not come into the Bladder in the same Manner; being obliged to convey my Probe sometimes to the right, or the left Side, towards the *Os sacrum*, or the *Pubes*, and sometimes farther; without mentioning a thousand other Circumstances, which may be better known by Practice than by any Discourse. What I have said, will be confirmed by the most experienced Surgeons, whom I have seen practice the same Thing, especially by Mr. *Petit*, to whom I am very much indebted, and particularly for the Probe.

THERE is still another Way of introducing the Probe into the Bladder, called probing upon the Belly. In order to do it, the Operator takes the *Penis* in the Manner I have already said: He lays it along the Belly, and introduces the Probe into the *Urethra* according to the Rules above mentioned, turning the Cavity of its Bending towards the Belly; and removing by Degrees the Rings of the Probe from the Belly, he introduces it into the Bladder, without being obliged to make the half Turn.

I have said, there are three Advantages arising from the Introduction of the Probe into the Bladder; that the first consists in facilitating the Com-
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ing out of the Urine ; the second, in discovering that there is a Stone ; and the third, in shewing us what Condition the Bladder is in. All that I have just now said about probing, concerns the first Advantage. As for the other two, the Surgeon must have the usual Probes, that is, those with a long Beak ; for those, that have been invented by Mr. *Petit*, do not get far enough into the Bladder ; and cannot enable an Operator to know well what he looks for in it.

WHEN therefore he has introduced the Probe into the Bladder, in order to know whether it contains a Stone, he makes small Concussions, inclining a little the End to the Right and to the Left, without turning the Probe altogether ; and according to the Advice of Mr. *Tolet*, sworn Surgeon of *Paris*, and the King's Operator for the Stone, he lets down a little the Rings of the Probe, that the End may be introduced a little farther into the Bladder ; taking Care however not to let them down too much, lest the End should hit the Bladder somewhere too violently. He also brings sometimes the Rings of the Probe towards the Belly, without taking the Probe out of the *Sphincter*, drawing a little the Rings of the Probe ; and with the Help of such Motions he feels some Resistance, and sometimes hears a little Sound, which is a Sign that there is a Stone.

IF notwithstanding all those Motions the Surgeon perceives nothing, he withdraws the Stilet ; and when a little Urine is come out, he lays his Finger before the Orifice of the Probe to keep the Urine from coming out, and to make again the same Motions.

THE Probe not only shews that there is a Stone in the Bladder, but also enables the Operator to judge whether it be large or small, smooth or uneven, hard or soft.

HE knows by the Probe that the Stone is large, because he always feels it at the End of the Probe, and because he finds it with the least Motion. The contrary is a Sign of the Smallness of the Stone; for the Operator having much ado to find it, and feeling it at one time, and not finding it the next Instant; he may very well conjecture that its small Bulk is the only Reason why it changes its Place.

THE Smoothness of a Stone plainly appears, when the Probe slips over it without any Resistance. On the contrary, its Unevenness discovers it self by some Eminencies and Cavities, and by a Ruggedness, that are felt at the End of the Probe.

THE Hardness of a Stone is known, when the Operator feels a Heaviness, especially when it moves a little. Besides, he hears it sound. On the contrary, he knows that 'tis a soft Stone, when he does not perceive so great a Heaviness, and when it hardly sounds at all.

LASTLY, the Introduction of the Probe into the Bladder shews what Condition it is in, that is, whether it be large or small, whether it be purulent, or whether there be any unequal Bridles in its Cavity.

SINCE we have made it our Business to know all the Differences of the Stones of the Bladder, those diagnostick Signs must enable us to draw some Consequences, whereby we may judge of the Success or Disappointment of the Operation.

I suppose, for Instance, a Man of a weak Constitution, advanced in Years, and who has been for a long time tormented with many Diseases arising from a Stone in the Bladder. The Surgeon having introduced the Probe into the Bladder of such a Patient, and observing by the Signs above mentioned that the Stone is very large, he ought to be very wary in his Prognostick, and draw this Consequence, that supposing he was so lucky as to extract the Stone, it could only be done by dilating the Wound very much, and creating a great Pain to the Patient; whereby he would quickly be brought to his Grave. In such a Case, a Surgeon ought to be more tender of his Reputation, than willing to shew, he can operate; and if the Patient and his Friends are for the Extraction of the Stone, he must be advised and assisted by prudent and learned Physicians and Surgeons.

I have seen large Stones extracted, both at the *Hotel-dieu*, and at the *Hopital de la Charité* at *Paris*; but the Patients, though old, being of a strong Constitution, were cured without any Accident.

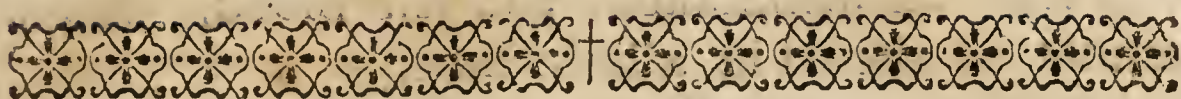
WHEN the Operator finds with the Probe a Stone either small, or middle siz'd; when the Patient is young, and seems to enjoy a good Health; the Prognostick, in all Appearances must needs be very good. I say, in all Appearance; for I have seen very young Patients, of a good Constitution, who bore the Operation with great Courage; and yet they quickly died, though the Operation was well performed. On the contrary, I have seen lean and languishing Patients, who recovered so fast, that all their Friends were amazed at it.

PRO-

PROBING may also afford good or bad Consequences about the State of the Bladder; for if it be very large, and contains a Stone of a middle Size, and if the Patient whether young, or old, be of a good Constitution, the Prognostick must needs be very good; tho' still more so indeed, if the Patient be young. But, on the contrary, if it appears by the Probe that the Bladder is small, and the Stone very large, whether the Patient be young or old, the Prognostick is very doubtful, and will be very bad in the last Case.

IF the Bladder be not large, and contains but a small Stone, and if the Patient appears to be a Man of a good Constitution; there is Ground to hope for a good Success, especially if the Patient be young.

THERE are also small Bladders, which contain only a Stone of a middle Size, but they are, as it were, grown horny. When such things happen to be in a Man, old or young, lean and languishing, it is a Sign of Death: And if the Patient recovers on account of his Youth, he will be troubled with an incurable *Fistula*, as long as his Blood continues to be as bad, as it is generally in such Cases.



C H A P. XVII.

How the Patients ought to be prepared for the Operation of Lithotomy.

WHEN the Surgeon knows, by the Signs above mentioned, that there is a Stone in the Bladder, and after he has deduced from it the diagnostick and prognostick Signs, he must, if he resolves upon the Operation, prepare the Patient some time before by several Remedies, as I am going to shew.

THE Design of Physicians and Surgeons, in such Preparations, is to make the Blood fluid, that no Disorder may happen in the several Parts of the human Body, especially in those, wherein some Divisions are to be made. It plainly appears from this Indication, that some Patients require longer Preparations, and a more particular Care than others.

THOSE Patients, who seem to have a good Constitution, and to whom some Remedies have been lately prescribed, such as Phlebotomy, Purges, &c. do not want a long Preparation. On the contrary, those that are wasted through Sickness, and have but little Strength; those who have been in Want, or have had a bad Food, and are consequently weakened by the Pains and Infirmities arising from the Stone; I say, all those Patients

ents have an acrimonious and salt Blood, which cannot be altered in a little time.

LASTLY, those Patients, who, though full of Humours, have used no Remedies in their Diseases, and those who have used them for a long time, hoping by that Means to avoid the Operation, I say, all those Patients ought to be more particularly minded in the Preparation; the former, to evacuate the great Plenty of bad Ferments, and superfluous Humours; and the latter, to restore the Strength which they have lost by the Action of a great Number of Remedies, that have, if I may say so, overthrown the natural Order of the Liquids, and the regular Functions of the Organs.

THERE is no Place, where People troubled with the Stone are better tended than at the *Hotel-dieu*, and the *Hopital de la Charité* at *Paris*.

THE Operators in those two Places are doubtless some of the most experienced, and have a particular Dexterity in that Operation. The Aliments, prescribed by Physicians and Surgeons, are carefully distributed; which is of great Use to cure the Patients.

LASTLY, the Number of the Patients, that are cut every Year in those Hospitals, is so great, and the Success so happy, that I should wrong the learned Surgeons, who exercise their Profession in those two Places, if I did not follow them in that Operation.

As soon as the Patients come to the *Hotel-dieu* in order to be cut, 'tis usual for the Space of a Week to let them rest, to refresh them, and to sweeten their Blood with some Emulsions, Rice
and

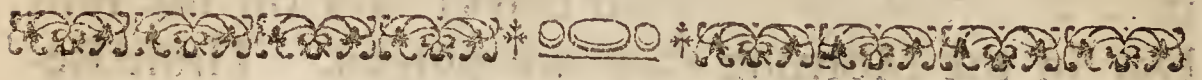
and Chicken-Broth, or to strengthen them with good Food, according to their Wants.

SOME Patients, especially Children, happen sometimes to be troubled with Worms, or are suspected to be so. The Remedy prescribed to them on that Occasion is *Mercur. Dulc.* which they take every Night for four Days; and on the fifth Day in the Morning they are purged. Those Remedies are repeated as often as 'tis thought necessary. But because the Mercury heats sometimes the Mouth, and may excite small Ulcers and a Salivation, I think that instead of the *Mercur. Dulc.* one might prescribe the *Æthiop. Mineral.* which has the same Effect, and is not attended with the same Accidents.

A moistening, cooling, and softening Nourishment is given for a sufficient time to those, who seem to be of a bad Constitution, and are wasted through the Violence of the Disease, and the bad Food they have used at Home. The same Care is taken of those, that are lean, weak and languishing, by having taken a great many Remedies, especially with a Design to prevent the Operation, and which were frequently given them by Quacks and ignorant People.

THE only Remedy, given to those two Sorts of Patients, is a very gentle Purge two Days before the Operation; and the next Day, they are bled according to their Strength and Age. Those who seem to be of a pretty good Constitution, are bled after a Week's Rest. Phlebotomy is repeated the very next Day; and they are purged the two following Days, the first Day gently, and the second Day more strongly.

LASTLY, on the Eve of the Operation all those Patients take a Clyster; and the next Day in the Morning, three or four Hours before the Operation, grown Men eat two new-laid Eggs, and Children but one, with a large Glass of Wine, or a small Toast with Wine and Sugar.



CHAP. XVIII.

Of the Operation of Lithotomy, or the Extraction of the Stone.

OF all the Seasons of the Year, that which seems to be the most proper for Lithotomy, is the Spring, about the Beginning of *May*.

THE Surgeon pitches upon that Season, because the Air is pure and clear, and the Heat moderate; for great Heats are contrary to that Operation: Which is the Reason why the Patients are also cut about the Autumn, *viz.* in *September*, till the Middle of *October*.

IF the Heat be very great on the Day pitched upon for the Operation; if it was also very hot Weather the foregoing Days; and if it thundered on the appointed Day; the Operation must be put off, till the Weather be more calm; for the Air being hot, and likely to cause Thunder again the following Night, such Accidents might happen as would occasion the Death of the sick Persons. Some grow only weak, and have a small Sweat; but others having been frightened, their Pulse is irregular, because

because they had no Rest in the Night, and because their Blood is in Motion by reason of their Fright.

I was once at the *Hopital de la Charité* at *Paris*, when about thirty Patients were cut. Two or three Days after, the Weather grew very hot: It thundered with great Violence a whole Day and Night; and that Storm occasioned the Death of ten or twelve Patients. The next Day after those Operations, many Persons were cut at the *Hotel-dieu*, and because they were affected by the Storm much in the same Manner, some of them died also; but tho' the Patients were in greater Number, yet the Loss was not so considerable.

AN excessive Cold is also very pernicious to those, that are cut; for it occasions a Rheum, and consequently violent Motions to cough, which prevents the Re-union of the divided Parts. From whence it appears that the Room ought to be kept warm, and that proper Remedies for a Rheum ought to be given to the Patient. But notwithstanding those Precautions, the Fever does frequently happen with a Defluxion of the Breast; and sometimes the Patient dies.

LASTLY, the Room, where the Patient is, and those that tend him, must be clean: The Linnen made use of at every Dressing ought to be new washed.

ALL those Things being thus prepared, and the natural Parts of the Person that is to be cut, being shaved, the Surgeon must call for a Dish to put his Instruments in; and their Dimensions ought to be suitable to the Size of the Patient. The Instruments proper for Lithotomy are a solid Probe, with a large Bending, which begins with a

blunt Shoulder, and it ought to have a Groove in its Convexity. That Probe should be made of Steel, that it may be faster, and make a greater Resistance to the Impression of the *Bistouri*. Its Rings ought not to be like a Circle, as those of Probes, but like an S on each Side, or like two small Wings that represent a Heart; that a more extended Surface may give the Surgeon a better Hold. Afterwards the Operator places upon the Dish the Conductor, Forceps, Scoop and Hooks. I shall speak of those Instruments, when I come to give a general Description of them. In the next Place, the Surgeon takes a Fillet, about one Foot or one Foot and a half long, and splits it at one of the Ends, about the Length of six or seven Inches. He rolls the Fillet about an opened *Bistouri*, called by some *Lithotomus*, to fasten its Blade upon the Scales, and when the two Heads of the Fillet are stopped with two Knots, he puts the *Bistouri* in the Middle of the Dish, upon a square Compress, which will be of use, as I shall say hereafter.

AFTERWARDS a proper Place must be pitched upon, for a convenient Situation of the Patient. At the *Hotel-dieu*, where that Operation is very common, there is a Bed made on Purpose, very high, and obliquely situated. But because such a Convenience is not to be had in private Houses, they use a square Table, upon which they lay down a Chair, placing the upper Part of its Back at four Inches distance from the Edge of the Table; and there they make it fast with Ropes tied about the Feet of the Table. They lay upon the Back of that Chair many Blankets doubled six or eight times, and over them some Pillows; lastly, they cover the whole

whole with a large Sheet doubled four or six times. The Table ought to be situated in such a Manner, that the Light may fall a little sideways upon that Place, where the Operation is to be performed.

THIS Apparel being ready, the Patient is laid upon that Table, where his Buttocks are somewhat raised, and his Head and Body half inclined backwards. But to keep the Patient in a steady Situation, he must be bound with two silk or thread Ligatures, each four Inches broad, and two Ells and a Half Long, sowed together in the Middle. The Operator applies the sowed Part of those Ligatures to the lower Part of the Neck behind the Head, and brings the two Heads of every Side over the Shoulders. Afterwards, he takes the two Heads of one Side, and a Servant those of the opposite Side; and then both of them stand before the Patient, and make him set his Feet against 'em. In the next Place, the Surgeon and the Servant take the Heads of the Ligatures, which are upon the Shoulders; and each of them on his Side conveys one forwards over the *Clavicula*, and the other backwards over the *Omoplate*, to cross them both under the Arm-pit, turning them three or four times, as if they were to be twisted together. Afterwards the Patient bends his Thigh; and one Head of those Ligatures is conveyed to its internal Part, and the other to the external, that they may be crossed with two Turnings at the hinder and middle Part of the Thigh. Which being done, the Heels of the Patient are brought near his Buttocks, and one Head is conveyed to the internal and lower Part of the Leg, and the other to the external: They are crossed upon the Instep, and conveyed in-

ternally and externally under the Sole of the Foot, where they pass one over the other. Afterwards, the Hand of the Patient is brought near the external *Malleolus*; and he lays his four Fingers under the Sole of the Foot, and the Thumb on the upper Part: And then the Hand in that Situation is bound with the two Heads of the Ligature; the Wrist being fastened with the lower Part of the Leg, and the Fingers with the Foot.

WHEN the Patient is thus bound, the Surgeon puts him in the most convenient Manner, to perform the Operation more easily and safely. Afterwards, he places the Servants, who are to help him. The first is upon the Table, behind the Chair: He lays the four Fingers of each Hand upon the *Claviculas*, and the Thumbs upon the Shoulders of the Patient, and so keeps him always down upon that Bed. Two other Servants stand on both Sides of the Patient: They lay one Hand upon his Knee, and the other upon his Foot, taking Care to keep them asunder, and to support the Patient. A fourth Servant standing upon a Chair near the Table, on the right Hand of the Patient, raises the *Scrotum*, and bends the Skin, as I shall say by and by. A fifth Servant, on the right Hand of the Surgeon, holds the Instruments, to give them one after another, and to take them from the Operator, in order to put them again upon the Dish.

THE Surgeon, standing between the Legs of the Patient, takes the grooved Probe, dipping it into Oil, and introduces it into the Bladder, in the Manner above mentioned; and when he feels the Stone, he bids the fourth Servant, who stands
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on the right Hand of the Patient, to raise the *Scrotum*; because I suppose, the Incision is to be made on the left Side of the *Perinæum*; for if it was to be made on the right Side, that Servant should be on the left Hand. The Servant takes the *Scrotum* very nicely with one Hand, and then brings the other to hold it up, whilst the Operator, who holds the grooved Probe with his left Hand, brings its convex Part against the opposite Surface of the *Urethra* under the Arch of the *Pubes*, in such a Manner that it may rise at one Inch's distance from the *Raphe*. Then the Servant, who is appointed to hold the *Scrotum*, lays the Fingers of the Hand, which held it, on the Side of the *Raphe*, and of the Rise of the Probe. But the Thumbs ought to be laid in such a Manner, that they may not compress the *Scrotum*; for that Compression does frequently occasion an Inflammation, a considerable Tension, and a great Abscess, which generally deprive the Patients of their Lives, as I have observed, though the Operation had been performed by very able Lithotomists. The Thumbs must also be laid in such a Manner, that they may not constrain the Operator in moving the Probe. In order to prevent all those Inconveniencies, Mr. *Thibaut* places them on the Out-side, bringing the fore-Fingers on the Sides of the Staff, and drawing the *Raphe* a little towards the right Side.

THE Surgeon, holding the Probe fast towards the Skin of the *Perinæum*, takes the *Bistouri* from the Servant, who holds it in the Middle, the Blade towards the In-side of his Hand, and the Wrist somewhat bent. The Operator takes it in the same manner as if it was a Writing-Pen, and puts it into his

Mouth, that he may feel with his fore-Finger the Place, that corresponds with the Convexity of the Probe, and look in that Place for the Groove of the Probe, just as a Surgeon looks for a deep Vein, in order to let blood. When the Operator feels the Groove of the Probe, and perceives that Part of the Skin, which corresponds with it, he takes the *Bistouri*, that is in his Mouth, and conveys the Point to the Place which he has observed, thrusting it gently till it be got into the Groove of the Probe; and then he descends towards the *Anus*, inclining the Instrument to make it cut with the Edge, that he may save the Point, which must cut entirely what the first Stroke of the *Bistouri* did not cut, ascending towards the upper Part of the Incision, and descending again towards the lower. But because, according to this Way of making the Incision, the Surgeon cuts more of the Teguments than of the *Urethra*, there is another Dilatation, which consists in conveying a little the Point of the *Bistouri*, and the Probe towards the Neck of the Bladder, holding the Wrist downwards, and taking care that the Point of the *Bistouri* does not leave the Groove of the Probe: For when the *Bistouri* cuts the Teguments and the *Urethra* alike, it does sometimes pierce the *Rectum*. Afterwards the Operator ascends to the upper Part of the Incision; and when he is come to it, he holds the *Bistouri* down on the right-Side of the Patient, and bids the Servant, who holds the *Scrotum*, keep the *Bistouri* in that Situation,

SUCH is Mr. *Thibaut's* Method of making the Incision: He says, it ought to be made under the Arch of the *Pubes*; that its lower Angle must be
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at two Inches Distance from the Edge of the *Anus*; and that the Incision should be of a different Length, according to the Difference of the Patients and Stones. For instance, if it be a Child, as far as nine or ten Years of Age, and if the Stone be small, or of a middling Size, the Incision must be an Inch long. From ten Years to five and twenty, if the Stone be large enough, the Incision ought to be two Inches long. Lastly, for the largest Stones, and for the oldest People, the Incision must be three Inches long.

Mr. *Marechal*, Counsellor, and chief Surgeon to the King, conveys immediately the Point of the *Bistouri* almost to the same Place, where the Incision is to end; and from thence he ascends towards the *Penis*, and descends in the same manner as I have said. It may be said in his Praise, that he performs that Operation with such a Dexterity and Quickness, that I have seen him cut eight Patients in half an Hour and some Minutes.

THE Incision being made, of a Length suitable to the Patient and the Bigness of the Stone, and the *Bistouri* being stopped towards the upper Angle of the Incision, and held by a Servant with the Point in the Groove of the Probe; the Servant intrusted with the Instruments, presents to the Surgeon the Conductor dipt in Oil: (I must observe by-the-by, that all the Instruments which are to be introduced into the Bladder, ought to be first dipt in Oil:) the Surgeon takes it, concealing the Branches in the Palm of his Hand; and laying his fore-Finger upon the Eminence, that is all along that Instrument. He conveys it, with the Help of the *Bistouri*, into the Groove of the Probe; and then bids
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the Servant withdraw the *Bistouri*; and the Operator removing a little the Rings of the Probe from the Belly of the Patient, conveys that Instrument into the Bladder with the Probe, taking care not to thrust it too far; for if it be a narrow Bladder, it will pierce the Bottom of it, and occasion Death. This Accident has frequently happened; and Mr. *Fauvel*, a Scholar of Mr. *Mery*, told me he had opened many Bodies of Patients, who died soon after the Operation; and that he found the Bladder pierced at the Bottom in several of them. The Operator knows that the Conductor or Gorgeret is in the Bladder; because he plainly perceives he is in a large Cavity; but the most certain Sign is, that when he gets into it, he sees the Urine come out thro' the Wound, tainted with Blood. He must then take out the Probe.

THE Lithotomists at the *Hopital de la Charité* do generally turn the Eminence of the Conductor (after it has been introduced into the Bladder) towards the lower Part of the Wound; and holding it with the left Hand, they convey the Fore-finger of the right Hand into the Bladder, driving it very far: Thus they make the Dilatation of the Wound. I shall by and by mention the Method used by the Lithotomists at the *Hotel-dieu* to make that Dilatation.

IF the Surgeon makes the Dilatation of the Wound, as I have just now said, he takes hold of the Conductor with his left Hand, and takes from the Servant entrusted with the Instruments the female Conductor, which he takes in the same Manner as the former, and introduces it into the Bladder, conveying it above the Eminence of the first or male Conductor.

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THOSE Instruments being in the Bladder, the Surgeon holds the Extremities, which are between the fore and middle-Fingers of his left-Hand, having those Instruments in the Inside of the Fingers, the Hand being situated in such a manner, that the Fingers be above the Wrist, and their external Part be next to the Wound. In that Situation, the Servant entrusted with the Instruments, presents to the Operator a strait or crooked Forceps, as the Surgeon thinks fit; and the latter sliding it between the fore and middle-Fingers, and the Conductors, drives it, by the Help of them, into the Bladder.

Mr. *Marechal* does not make use of the Conductors, but instead of them he introduces the Gorgeret into the Bladder, and conveys the Forceps above the Instrument.

WHEN the Forceps are in the Bladder, the Surgeon takes them with his left-Hand to withdraw the male and female Conductors, beginning with the latter. Afterwards he takes the Rings of the Forceps with both Hands, and thrusts them towards the Bottom of the Bladder; and then he opens the Forceps side-ways. Such is Mr. *Thibaut's* Method of dilating the Wound, which he prefers to the former above-mentioned, for several Reasons too long to be here explained. That Dilatation being made, the Operator must search for the Stone, and when he feels it, he charges and extracts it.

IF, the Forceps being introduced into the Bladder, the Rings are too far remote, the Surgeon must introduce into the Bladder under them the Button of the Scoop, and feel the Stone, to know whether its Bigness is the Cause of that Wideness; or whether it be that the Stone is too near the Ri-
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vet of the Forceps ; or whether being of an oval Figure, the Forceps charge it by its greatest Diameter.

IF the Dilatation of the Rings of the Forceps is occasioned by the Bigness of the Stone, the only Remedy is to extract the extraneous Body, by taking the Rings with the right-Hand ; and conveying the left-Hand near the Wound, the Surgeon makes several Motions on all Sides, &c. If the Dilatation of the Rings of the Forceps proceeds from the too great Nearness of the Stone to the Rivet, the Surgeon must repel it a little with the Button. But the best way to prevent that Accident, is to get such Forceps made, as are only uneven about one half of their Length, and that the nearest Place to the Rivet be smooth, that the Stone may slide upon it. I am indebted to Mr. *Petit* for this Observation.

LASTLY, if the Dilatation of the Rings proceed from this Cause, *viz.* That the Stone being of an oval Figure, is pinched by its two Ends, the Surgeon must endeavour to turn it ; and then he takes it out, as I have shewed above.

WHEN the Operator has extracted the Stone out of the Bladder, if he perceives in it smooth Surfaces, which seem to proceed only from the rubbing of another Stone, he must introduce the Button into the Bladder, and convey over its Ridge a Pair of Forceps much smaller than the former ; which he must do as often as he thinks there are Stones, without making the Patient suffer two or three Days after the same Operation, taking care however that the Patient be strong enough to bear the Operation.

BUT if the Surgeon should extract a soft Stone, and some Fragments should remain in the Bladder, he must not introduce the Forceps or the Extractor,

tor. On the contrary, he must put a Tent in the Wound, as I am going to say ; and that Gravel will come out afterwards with the Urine.

THE Operator extracts sometimes with a Stone some Excrescences, which are only formed by an Ulcer or tearing of the Bladder. This Accident is frequently attended with Death ; or the Patient remains fistulous.

LASTLY, when the Surgeon has extracted the Stones out of the Bladder, he must lay upon the Wound the square Compress, on which the *Bistouri* was placed, and then untie the Patient, and carry him to his Bed.

THE Method of operating, which I have described, is called the great Dressing, or Cutting upon the Staff. I have said nothing of the high Dressing, which consists in making an Incision above the *Pubes*, in opening the Bladder at the Bottom, and extracting the Stone that Way. If I have passed over in silence that Method, 'tis because I never saw it practiced, and because it is now wholly laid aside. Yet if one reflects upon the Experiments, which I have mentioned to prove that the Wounds of the Bladder are only mortal in those Parts wherein the Urine stays for some time, it may be inferred, that a Wound made with a cutting Instrument, at the Bottom of the Bladder, might be as easily cured as at the Neck. Besides, we have some Instances of it in the Antients : Wherefore I hope that Operation will be revived in time, and that the learned Surgeons of *Paris*, who make it their business to find out the plainest, the safest, and the shortest Ways of operating, will give us hereafter some Instances of it. I say the same about the Incisions

Incisions of certain Parts of the *Abdomen*, to which they are now averſe; but I have ſeen them practiſed by my Father with very good Succels.

THE Situation of the Stone obliges us ſometimes to make uſe of a third Method of Operating. For inſtance, when it is very near the *Perinaeum*, and in the Neck of the Bladder, one muſt perform the Operation of Lithotomy with the Little Dreſſing, which is Cutting upon the Gripe. It is ſo called, becauſe it does not require ſo many Preparations as the Great Dreſſing.

IN the firſt place, the Patient is brought to the Edge of his Bed, with his Heels cloſe to his Buttocks, and the Knees aſunder. Afterwards, the Surgeon dips the fore and middle-Fingers of his left-Hand in Oil, and introduces them into the *Anus*, as far as he can, to put them beyond the Stone, in order to bring it nearer, and to raiſe it behind. Which being done, the Surgeon bids a Servant raiſe the *Scrotum*; and holding the *Biſtouri* with his right-Hand, he makes an Inciſion upon the Tumor, and takes out the Stone, by preſſing the Extractor behind its upper Part.

Novemb. 17. 1713. I ſaw that Operation performed at the *Hotel-Dieu*, upon a Man, who ſeem'd to be between five and thirty and forty Years of Age. The Stone lay in the Neck of the Bladder. Mr. *Thibaut* raiſed the *Scrotum* with his left-Hand; and with the Thumb and fore-Finger, he preſſed the Stone towards its lower Part to ſecure it; becauſe it was immediately under the *Scrotum*. Afterwards, he made an Inciſion with the *Biſtouri* or *Lithotomus*, upon the whole Extent of the Stone,
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and extracted it with the Scoop; the Patient being in his Bed.

BEFORE I make an end of what concerns the Operation of *Lithotomy*, I must say something about the Method of extracting the Stone out of the Bladders of Women.

THEY are less subject to the Diseases of the Bladder than Men; because the Canal, which conveys their Urine out of the Bladder, is much shorter, straiter, and larger than that of Men. And therefore there is not so much Difficulty in probing Women: It is enough to make them keep their Thighs asunder, whether they lie or sit upon the Edge of a Chair, to keep the Lips asunder, to raise the *Clitoris*, and to introduce a strait Probe, somewhat crooked at the end; and it will get into the Bladder without any Opposition.

WHEN the Surgeon knows by the Probe, that there is a Stone in the Bladder of a Woman, he places her, as well as Men, upon the Bed above described. She must be tied in the same Manner; and some Servants must stand by her, performing much the same Office, as when a Man is cut.

EVERY thing being ready, the Servant who rais'd the *Scrotum* of a Man, keeps the Lips asunder with his two fore-Fingers; and the Surgeon raising a little the *Clitoris*, as I have already said, perceives the *Urethra*, into which he introduces at first the Male-Conductor; and as soon as it is in the Cavity of the Bladder, he searches and secures the Stone. When he has found it, he conveys the Female-Conductor into the Bladder. Those two Instruments being in the Bladder, ought to be kept asunder, to dilate the *Urethra* in order to make room for the *Forceps*.
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Afterwards, the Operator puts the Conductors between his fore and middle-Fingers, as I have said, speaking of the Operation performed upon Men, and thrusts the *Forceps* into the Bladder: And then he takes out the Conductors, and charges and extracts the Stone, as I have said, in relation to Men. He lays immediately a Compress upon the Opening of the Canal of the *Urethra*, to keep the Air from getting into the Bladder: He unties the Woman, and dresses her, as I shall say hereafter.

THIS Description is nothing but what I have seen practiced, at three several times, by Mr. *Thibaut* one of the most dexterous and experienc'd Lithotomists in our Days.

THE Operation being over, and the Patient being in Bed, what remains is only to give an Account of the Dressing.

THE Surgeon bids the Patient raise her Knees a little, and keep her Thighs asunder; and then he takes off the Clods of Blood to be found in the Wound and its Circumference. Afterwards, he acts differently, according to the Stones that have been extracted; for if the Stone is soft, if it has been bruised, or if there is any ground to believe that some Fragments remain in the Bladder, the Surgeon must keep the Incision open with the help of a Tent or a silver *Cannula*, to facilitate the coming out of extraneous Bodies, such as the Fragments or other Matters. But if he uses a silver *Cannula*, it being hard, and about five or six Inches long, it may be very troublesome to the Patient, and frequently occasion Disorders, which might perplex the Surgeon. In order to avoid the Inconveniencies of the *Cannula*, without losing the

the Benefit of it; the Operator puts in a pliant *Cannula*, covered, in its whole Length, with a Fillet, and passes two small Heads of it thro' the Rings: Afterwards he makes fast the *Cannula*, with a small Fillet or Compress, and split in the Middle for the Passage of the Instrument. The Surgeon, who has invented that *Cannula*, is a great Operator, and a Man of a great Genius: 'Tis Mr. *Tolet*, the King's Lithotomist.

IN order to introduce the pliant *Cannula* into the Wound, it ought to be armed with its Stilet, and the Surgeon must introduce his fore-Finger or the Button into the Bladder, and convey the *Cannula* with their Help. Afterwards, the Patient is differently dressed, according to the several Methods of the Operators. Mr. *Guerin*, heretofore Master of the *Hopital de la Charité*, covers the Wound with dry Plagets, Dosels, Compresses, and a *Suspensorium*.

THE Lithotomists of the *Hotel-Dieu* dress their Patients differently. In the first Dressing (I suppose there is no occasion to use a Tent) they apply upon the Wound a Plaget covered with an Astringent made with *Bol. Armen.* Vinegar, *Cerat*, and *Ol. Rosatum*. Afterwards, they make an Embrocation with *Ol. Rosatum* upon the Belly, in the Groins, upon the *Scrotum*, and at the Circumference of the Wound; and then they apply upon the Plaget a simple Compress, cut like a Horse's Shoo, and covered with the same Astringent; the Whole being dipt in *Oxycrat*, a simple Compress pierced to let in the *Penis*, covered with the same Astringent; and above that whole Dressing a double Compress dipt in warm *Oxycrat*. The whole is supported with a Bandage, called the double T,
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the Middle whereof is applied to the hinder and lower Part of the *Lumbi*, and the two Ends come about the Belly to be tied on the Side, by passing one of the Ends into a Bandage, called the Collar, and which being tied behind the Neck, hangs down to the Navel. Afterwards, the Surgeon takes the Heads of those Bandages, which are between the Thighs, to pass them above the Wound and Groins, one on each Side; and then he passes them about the T, which serves instead of a Girdle, and ties them together on the Side opposite to the Knot of the Girdle.

Now the Surgeon must hinder the Patient from keeping his Thighs asunder; which he might do in his Sleep, and sometimes without minding it. But to prevent this, the Surgeon fastens them at a certain Distance from one another, with the Help of a Roller, the Middle whereof he applies to the upper and external Part of the right-Knee. For instance, he passes one Head under the Thigh, and the other above it; he crosses them between the Thighs, twisting them twice; and then he passes those two Heads above and under the left Thigh, to end at the external Part. That Bandage is called the *Garter*.

BECAUSE the Urine and other Excrements fall into the Patient's Bed, they put under him a Sheet folded in several Doubles, and rolled at one End. That Roll lies on the right-Side, for instance, of the Patient; and when that Part of the Sheet, which lies under the Patient, is spoiled, they pull it on the left-Side, whilst they unroll Part of the Roll, that is on the right-Side.

THE following Dressings are also different from the former, because the Surgeon uses no longer any
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Astringent, but covers the Plagets with a soft and suppurative Balsam, laying above it a Plaister, and a Compress in six or eight Doubles, a Foot long, and three or four Inches broad, in the Shape of a *Suspensor*.

A GAIN, the Surgeon changes the Balsams and Ointments, according to the Indications and the different Accidents that happen. Nay, he is sometimes obliged to make Injections into the Bladder; sometimes to dress the Patient very often, and at other times seldom: In many Cases he uses no Bandage; and sometimes he leaves the Wound without putting any thing to it. All those Differences depend upon the different Alterations in the Wound, and the adjacent Parts; but I shall not mention 'em, because I should be obliged to explain them mechanically, and to assign the Remedies proper for each of them; which would carry me too far. Those who desire to satisfy their Curiosity, must attend the Dressings at the *Hotel-Dieu*.

BEFORE I make an end of those Dressings, I must observe that the Dressing of Women, is somewhat different from that of Men. However the Surgeon uses the same Medicaments; but instead of the Horse Shoo, and the *Suspensor*, he makes use of a single and double Bandage in the Shape of a Case for Spectacles; and the remaining Part of the Cure is performed much in the same Manner as in Men.

THE Patients, that have been cut, are blooded, as Occasion requires: The Surgeon gives them Clysters, gentle Purges, and different Potions, according to the different Indications and Accidents; and therefore it is proper for him to consult a wise and prudent Physician.

THE Surgeon must prescribe a very strict Diet the first Days, confining the Patients to Broth, and some Spoonfuls of Jelly, to Diet-Drinks, and Rice and Chicken-Broth. At last, he increases their Diet by degrees, giving them a little Wine and a new-laid Egg, the Wing of a Chicken, and other Aliments, as the Time of their Cure grows nearer.



CHAP. XIX.

Of the Stone in the Urethra, and the Operations proper for it.

THE calculous Concretions above-mentioned being united together, either in the Kidneys, or in the Bladder, and having formed a small Body, hard, solid, and brittle, which, as it increases, occasions, as I have said, great Pains, and Concussions, that make it fall into the Bladder; it follows that being tossed up and down by the Urine, if its Diameter be proportioned to the Neck of the Bladder, it will get into the *Urethra*.

As soon as that small Body is in the *Urethra*, it stops the Passage of the Urine; and the Patient straining himself to void the Waters, makes a great Inspiration, and then keeps in his Breath to drive out the Urine. In that violent Action, the Diaphragm, which is naturally vaulted in the Breast, grows flat; and the Liver and Stomach are more impelled into the Belly: Those *Viscera* compress the Intestins, which press the Bladder on all Sides; and

and the Muscles of the *Abdomen* do not a little contribute to it by their Contraction.

THE Bladder being pressed on all Sides, the Urine will be forced into the Canal of the *Urethra*; so that the small Stone lying in that Canal, being continually impelled by a Column of Water, will move on by degrees towards the Middle, or the Extremity of the *Urethra*.

IF the Stone is large enough to fill up the Canal of the *Urethra*, it will compress the Blood-Vessels of its spongy Texture, and of the *cavernous* Bodies; which will occasion an Inflammation, Irritations, and great Pains; and the more the Urine flows into the Bladder, the greater will all those Symptoms be.

THE Surgeon knows that Disease, First, because the Patient cannot void any Urine at all; Secondly, because he feels a Pain, and very often a considerable Tention in that Part where the Stone lies; and if the Surgeon handles it, he feels a hard Body in the Canal of the *Urethra*.

THE Urine being kept in the Bladder by the Stone, which stops the Canal of the *Urethra*, all the Accidents attending the Urine kept in the Bladder, will also attend the Stone in the *Urethra*; and therefore a speedy Remedy ought to be applied, in order to destroy them all.

IF the Stone is stopped at the Extremity of the *Penis* in the *Fossa*, and if the Surgeon had pressed it behind to make it come out, without any Success, not even with a small *Curethra*, both upon account of the Inflammation and Bulk of the Stone, he must not scruple to make an Incision in the upper Part of the *Glans*: That Wound is soon

cured; and by that means the Surgeon can pass the *Curethra* behind the Stone, to make it come out.

IN order to dress that Wound, the Surgeon washes it with warm Wine, and lays upon it a small Plaget covered with an agglutinative Balsam, and a Compress cross-wise, with a Hole in the Middle to let out the Urine; and the Whole is fastened with some Turnings of a small Roller.

BUT if the Stone lies in the Middle of the *Urethra*, and the Surgeon has endeavoured to no purpose to make it come out, by pressing it behind, &c. it will not be amiss to inject some Oil into the *Penis*: (I suppose, the Surgeon presses still the *Penis* beyond the Stone, for fear it should return again into the Bladder.) Afterwards, he tries again to make it come out; and if all those Motions prove useless, he must speedily proceed to the Operation.

SURGEONS do generally make an Incision in the lower Part, or on the Side of the *Urethra*; but because the Urine comes out thro' the Wound, and prevents the Reunion, it is not improper to make that Operation according to Mr. *Thibaut's* Practice.

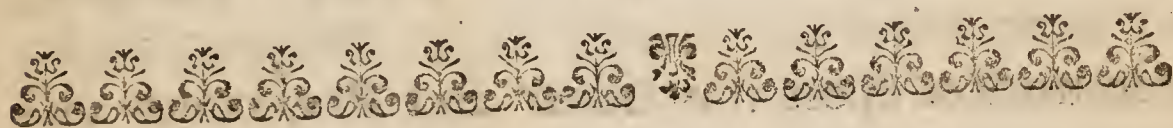
THAT Surgeon holds the *Penis* between his Thumb and the two next Fingers, and then makes an Incision with a strait *Bistouri* on the Side of the *Penis*, only in the Skin. Afterwards he uncovers the *Urethra* in that Part where the Stone lies; and there he makes an Incision in the *Urethra*, upon the Extent of the Stone, and almost under the cavernous Bodies.

THE Stone being uncover'd, he takes it out with a small Scoop, and dresses the Wound with a small Plaget cover'd with an agglutinative Balsam, with a circular Compress, and some Turnings of a small Bandage.

I think

I think the Wound of the *Urethra* may be speedily cured by that Method of Operating; because it lies almost under the cavernous Bodies, to which it will soon agglutinate, and because it is not parallel to the Wound, and lies in a Place through which the Urine cannot pass.

THE Patient must have little or no Drink, that he may not void much Water, and consequently that the Wound may be less washed with it. And therefore I think, it would not be amiss to probe the Patient immediately after the Operation, in order to empty the Bladder wholly; for the Urine is not a Balsam, which reunites that Part: On the contrary, we see that it occasions all the Disorders in the *Fistulas* of the *Perinæum*.



C H A P. XX.

Of the Phimosis.

BY the Word *Phimosis* is meant a Straitening of the *Præputium*, which prevents the Uncovering of the *Glans*.

THAT Straitening is either natural or accidental. The former is, when a Man is born with that Disease; but because it is not then attended with any Inflammation, it does not prove dangerous. However, it happens sometimes that the Urine, as it comes out, lodges between the *Glans* and the *Præputium*, and stagnating in that Place, its Salts are united, and grow larger. Which cannot happen without their having a greater Number of Surfaces, and being

more able to make strong Impressions upon the *Glans*, and the internal Membrane of the *Præputium*. And because those Impressions increase as the Salts grow in Bulk and Quantity; it is plain they will occasion a Pain, and that Want of Conformation will prove grievous in time. I have seen several People, who were born with a *Phimosis*, without being troubled with it; but I know a young Man of three and twenty Years of Age, who feels so much Pain in that Part, that he dares not touch it; and his Shirt, tho' never so fine, does sometimes trouble him very much.

THERE are two sorts of accidental *Phimosis*, one natural, and the other malignant. The natural *Phimosis* proceeds from the rubbing of the Shirt, or some other like Cause, which bringing an Inflammation upon the *Glans* and *Præputium* distends the former, and straitens so much the latter, that its Extremity forms a circular Body, which hinders the *Glans* from being uncovered.

THE malignant *Phimosis* proceeds from venereal Diseases. It happens sometimes in a *Gonorrhoea*, for instance; because the virulent Matter, which continually runs all along the Canal of the *Urethra*, coming to the End of it, finds itself in a Place somewhat larger, called by Surgeons the *Fossa*; and because the Canal of the *Urethra* bends a little in that Place, it plainly appears from thence, that the Matter will be forced to stay longer in it, and that some Part of it will always remain there.

IF the thickest and most clammy Matter, flowing from the *Vesiculæ seminales*, the *Prostatae*, &c. in a Clap; (for 'tis a Mistake to believe that the *Gonorrhoea* has its Seat only in the *Prostatae*; The

first

first and secondary *Vesiculæ seminales*, and all the Glands in the Canal of the *Urethra*, are infiltrated with the same Venom;) I say, if the Matter stays longer at the End of the *Urethra*, it will ferment; the corrosive Salts will be united together, and by that means grow more bulky, and consequently will be more able to tear and corrode that Part of the *Urethra*.

THE Extremity of the *Urethra* being thus corroded, as one may see, and as it plainly appears by the great Pain, which the Patients feel rather in that Part of the *Urethra* than in any other; I say, that Extremity will be the more inflamed, as the Corrosion is greater; and if the Inflammation comes to a certain Degree, it will attach the *Glans* and *Præputium*, and distend them both, so that the former will take up more Room; but the latter being straitened will cover the whole *Glans*, and so will occasion a *Phimosi*s. But if the *Glans* is not usually covered with the *Præputium* the latter will straiten the *Glans*, and make what we call a *Paraphimosi*s, which is a Disease quite contrary to that I am speaking of in this Chapter.

THE *Glans* and *Præputium* being generally distended, it follows that the Blood of the Veins will be stopt there in Part; and the Arteries forcing, as it were, the Compression, will always convey a little Blood into the *Glans* and *Præputium*: And because the Blood does not return from thence in the same Quantity, they will be distended, and inflamed more and more. The *Glans* and *Præputium* being thus inflamed, the small nervous Fibers, which convey the Spirits into them, will be distended, and violently moved by the least Impression;

sion; so that the least Bodies, which shall touch those Parts, will occasion very great Pains.

THESE Diseases do also frequently proceed from Chankers, Warts, &c. and even sometimes from corrosive and unseasonable Remedies; but the Readers will dispense me from explaining how that happens, because I should be obliged to repeat what I have just now said.

THE *Phimosis* is known by the Account I have given of it; and its Prognostick is more or less dangerous, according to the different Causes of that Disease. The natural *Phimosis* has nothing in it, that is bad: It is only liable to Inflammations; but the malignant one, being frequently a Consequence of the Pox, requires a greater Caution.



C H A P. XXI.

Of the Operation of the Phimosis.

WHEN the *Phimosis* happens to be natural, its Inflammation being the greatest Accident, which however might be attended with dismal Consequences, all Remedies, proper for Inflammations in general, ought to be used: And because Phlebotomy is the Specifick of all Inflammations, and is known by all learned Surgeons to be the most speedy Remedy, it ought to be used immediately, and repeated more or less, according to the Nature of the Disease.

THE Vessels being thus emptied, the Surgeon must relax the *Preputium* and the *Glans*, which
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are considerably distended. To that End, let him apply upon the affected Part some anodyne emollient Poultices, or Plaisters, as he thinks most proper.

IF the *Phimosi*s be a malignant one, he may begin with those Remedies; and because there are generally small Ulcers upon the *Glans*, whether they proceed from the Acrimony of the Matter, which flowing in a Clap gets between the *Glans* and *Præputium*, or are Shankers that have no Callosity in their Circumference, the Surgeon, in order to cleanse those small Ulcers, must introduce the End of a small Syringe, and make Injections. I have often cured a *Phimosi*s with those Remedies, without being obliged to proceed to the Operation.

BUT if that Method proves unsuccessful, and if the Surgeon handling the *Præputium* perceives by its Hardness that there are deep Shankers upon the *Glans*, he must perform the Operation to discover them, and to use proper Remedies.

BEFORE he performs that Operation, he ought to mind the Place of Election, and the Place of Necessity. The Place of Election is in the upper Part of the *Præputium*, without minding the Distribution of the Vessels. The Benefit arising from thence, which consists in conveying the Instrument farther, and uncovering equally both Sides of the *Glans*, is to be preferred to the small Hemorrhagy of the Veins of the *Præputium*. The Place of Necessity is to perform the Operation upon the Shanker, and on both Sides, if there are Shankers on both Sides.

THE Surgeon knowing the Place, wherein he is to perform the Operation of the *Phimosi*s, makes
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the Patient sit upon a Chair; and a Servant holds the *Penis* near the *Pubes*, whilst the Surgeon pulls a little the Extremity of the *Præputium* to make the internal Skin even with the external, and to remove all the Wrinkles, which might hinder him from conveying the Instrument far enough. Surgeons do generally use a small Pen-knife having two right Angles near its Handle, almost like a Wimble, and they put at its Point a small wax-Ball, to prevent pricking the *Glans* or the *Præputium*, when they convey that Instrument between them. But that Precaution is very useless; and when the Inflammation of those two Parts is very considerable, it is absolutely impossible to drive that Instrument through upon the Flat, beyond the Ridge of the *Glans*; and it happens that when the Surgeon conveys the Instrument, its Point pierces the small wax-Ball, and pricks the Patient, who feeling a Pain, makes some small Motions to withdraw; and the Surgeon being resolved to perform the Operation, pierces the *Præputium* in that Place, and makes an End of the Operation, which is not half performed, and consequently cannot ease the Patient, especially if there are any Shankers.

THIS happened to me once; and though I minded the Observations of good Practitioners, and those that are to be found in the best Books, yet I perceived that I had committed two Faults. The first was that, which I have just now mentioned; and the *Glans* was only half uncovered. But to shew that I had carefully observed the Precepts of the best Surgeons, I pulled very much the Skin of the *Penis*, with a Design to make a large Incision, as it is ordered; and after my Operation, the *Pe-*
nis

nis happened to be uncovered almost in its whole Length, there being still a Constriction upon the *Glans* by the internal Part of the *Præputium*. To remove that Constriction, which did not discover a Shanker, for which I performed that Operation, I conveyed the blunt Branch of the Scissars between the remaining Skin of the *Præputium* and the *Glans*; and when I perceived that it was beyond the *Glans*, I cut and uncovered a pretty deep Shanker, having its Edges raised and hard. I cured it with a sixteen or seventeen Days Salivation, excited by three gentle Frictions, and the other Remedies that are proper in such a Case. For 'tis a Mistake to fancy that the Purges and Diet-drink prescribed for such Shankers, can cure them. The Patient has still the Pox; and 'tis no Wonder if we see so many Children troubled with the Kings-Evil, Scurvy, Consumptions, and other Diseases of that Nature.

To perform the Operation all of a sudden, without running the Hazard of committing the first Mistake just now mentioned, Mr. *Lapeyronie* has made an Addition to the *Bistouri* for *Hernias*, which appears to me essential. Instead of the Screw which holds the Blade upon the *Cannula*, he has added to it a Screw, which has a great Hold, and may easily be removed; so that a Surgeon may introduce that *Bistouri* with the *Cannula*, beyond the *Glans*, without running the Hazard of pricking the Patient. Afterwards, he takes off the Screw, and gently withdraws the *Cannula*, so that the Blade being alone between the *Præputium* and the *Glans*, he takes it by its small Plate with his right Hand; and the fore and middle Fingers of the left
Hand

Hand being applied on both Sides of that Part, where he thinks the Point of the Instrument will come out, he pierces the *Præputium*, and immediately conveys his fore-Finger behind the Back of the *Bistouri*, which he withdraws, and so makes an End of the Operation.

PERHAPS that Instrument will not be approved by every Body; But I may say to Mr. *Lapeyronie's* Praise, that it appears to me much better than the usual Pen-knife; that the small wax-Ball at the Point of this last Instrument is liable to the Inconvenience abovementioned, especially when the Constriction of the *Præputium* is attended with a considerable Inflammation; lastly, that if I had made use of that Instrument, when I performed the Operation, of which I just now gave an Account, I should not have committed a Fault, which the most dexterous Surgeons cannot avoid in a like Case.

BEFORE I make an end of what concerns that Operation, it is not improper to observe, that most Practitioners advise to pull very much the Skin of the *Penis*, when the Instrument lies between the *Præputium* and the *Glans*, in order to make a larger Opening. Mr. *Petit* is against that Method, because the Surgeon by that means uncovers the Body of the *Penis*; which is needless, since the Disease does not lie in the Body of the *Penis*, and because that Method puts the Patient in great Pain, and cuts out more Work for the Surgeon than there is occasion for. He also says, that if the Skin is not sufficiently pulled, the Surgeon cuts only the internal Skin of the *Præputium*, and does not cure the Disease. To avoid those Inconveniencies, the

Surgeon

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Surgeon ought to make the internal Skin of the *Præputium* level with the external, as much as possible, and to cut no more of the one than of the other.

WHEN the Operation is performed, it frequently happens, that the *Frænum* does still very much pull the *Glans*. In such a Case, Mr. *Arnaud* advises to cut it: It is easily cured.

THE Dressing of that Disease being the same as for the *Paraphimosis*, I shall describe it in the following Chapter.



CHAP. XXII.

Of the Paraphimosis.

THE *Paraphimosis* is a Disease quite contrary to the *Phimosis*, because in the latter the *Præputium* conceals the *Glans* in such a Manner, that it cannot be uncovered. But in the *Paraphimosis*, the *Præputium* is so much drawn back and distended beyond the *Glans*, that 'tis impossible to bring it over.

THAT Disease proceeds generally from the same Causes as the *Phimosis*, especially in what concerns venereal Diseases. But it happens sometimes by a violent Effort, as when the *Præputium* is naturally somewhat narrow, and discovers but one half of the *Glans*. If it be then pulled towards the hinder Part of the *Penis*, as soon as it comes beyond the *Glans*, it does so constringe the *Penis*, that the *Glans* being immediately swelled, prevents the Reduction of the *Præputium*. ON

ON the first or second Day of that Disease, the *Præputium* is turned back as I have just now said, and makes a thick Body, which squeezing the *Glans*, distends it very much: The Skin of the *Præputium* is also considerably inflamed and swelled. But because the Blood running into the *Glans* has hardly a free Passage any longer, it flows in greater Quantity into the collateral Vessels; and those Vessels conveying it into the Skin of the *Præputium*, which is the Cause of the Constriction, it accumulates there in greater Quantity and distends that Skin very much; whereby the Constriction is encreased.

THE Skin of the *Præputium* being thus swelled, the small nervous Fibers reaching to it are very much distended, and consequently very susceptible of Irritations; so that the Spirits running plentifully into that Part, occasion a Pain, which shaking the small Nerves, repels the Spirits towards the Brain. And because those Irritations last as long as the Disease, the Nerves of the *Penis* give always a free Passage to the Spirits; which straitens the *Præputium* in several Places, and occasions four or five Edgings that make as many Constrictions, as it happens on the third and fourth Days, and sometimes sooner, or later, according to the Violence of the Disease. Those Risings compressing the Veins and the lymphatick Vessels, the latter are very much distended by the *Lympha*, and the former by the Blood; so that the lymphatick Vessels being very numerous in the fatty Cells of the *Præputium*, they distend it, and form a Tumor like a kind of a Circle beyond the *Glans*.

THE Constriction not being so considerable on
both

both Sides of the lower Part of the *Præputium*, and the Skin being there somewhat looser, the Lympha flows into it in a greater Quantity, and gathering in it by degrees, it occasions a Distention in that Place, and a very large Tumor, somewhat like another *Glans*.

THOSE Tumors distending the Skin of the *Præputium* more still, and increasing the Inflammation, the Heat increases proportionably; and the Arteries affording always a little Blood, contribute also to heat that Part. The Heat therefore grows at last so considerable, that it rarifies the *Lympha*, which is collected in the fatty Cells; and dissipating its watery Particles, nothing but a transparent Body will remain.

BUT the Blood being stopped in the Veins, as I have said, it stays there, and its Serosity has a sufficient Time to separate from it, and to philtrate thro' the Pores of the Coats of the Veins, in order to diffuse it self likewise into the fatty Cells, and to increase still the Tumors above-mentioned, especially that, which lies in the lower Part of the *Glans*.

AFTER what has been said, there is no need of mentioning the diagnostick Signs of the *Paraphimosis*. The Account I have given of it, is more than sufficient to distinguish that Disease; but its Prognostick is more or less dangerous, as the Inflammation is more or less considerable; and that which is occasioned by venereal Diseases, must needs be more dangerous than the others.

ALL Authors say, that when there is a considerable Inflammation, the *Penis* runs a great hazard of being mortified; and according to this Notion, some are against Topicks, the good Effect whereof

is too slow for a Disease, which requires a speedy Help. On the contrary, they advise to make with the Point of a Lancet small Incisions upon the internal Membrane of the *Præputium*. Others are for scarifying the Tumor lying in the lower Part of the *Glans*, to discharge the Part, and prevent a Mortification.

It is true, that when the *Paraphimosis* is come to the Degree, I have supposed, the *Penis* is in a very bad Condition; and the Liquids being stopped every where, there is ground to fear a Mortification. However, I have had two such Diseases under my Cure, which were attended with all the Accidents above-mentioned (for the Observations they afforded me, have enabled me to describe the *Paraphimosis* so exactly.) And yet I perceived in them no Disposition to a Mortification. I was rather afraid that the Wound made at the Foot of the *Glans* by the Constriction, should grow so deep, that some Arteries would be opened, which would have given me a great deal of Trouble.



CHAP. XXIII.

Of the Operation of the PARAPHIMOSIS.

SINCE the Inflammation and Tension of the *Præputium* and *Glans* occasion all the Accidents above mentioned, the Surgeon must endeavour to empty the Vessels, and relax the Parts, that are contracted. But before he tries any Remedy, he must use his utmost Endeavours to reduce the

Præpu-

Præputium. In order to it, he must consider what hinders it from coming over; and because the *Glans* is very much distended, and its Basis jets out, which is an Obstacle to the Success of the Operation, he must lessen the Bigness of the *Glans* by pressing it length-wise.

AUTHORS dispute about the manner of making that Reduction; for some will have the Surgeon to convey the fore and middle-Fingers of both Hands behind the circular Distention above-mentioned, and to draw it at the same time towards the Extremity of the *Glans*, without touching the *Glans*, especially about its Extremity; because if it be touched, it will be more distended.

THOSE Authors offend against the Precept, I have given, which consists in lessening the Bigness of the *Glans*, by drawing it longer; and if the *Paraphimosis* be attended with all the Accidents above-described, it is absolutely impossible to reduce it in that manner.

OTHERS advise the Surgeon to apply both Thumbs upon the Sides of the *Glans*, (I always suppose the fore and middle-Fingers to be behind the Distention of the *Præputium*) to lessen its Bigness.

THESE Authors offend also against the same Precept; for if they lessen the Bigness of the *Glans* on the Sides, they increase it at the same time in its upper and lower Part; nay, they increase it as much as they lessen it on the Sides. That Method therefore cannot be successful.

LASTLY, other Authors reject those two Opinions, and say, that those, who advanced them, were not very expert Surgeons; because, if they had practiced that Operation, they would have known that the *Glans* is so much swelled, and so hard, that whate-

ver Endeavours be used to cover it, 'tis impossible to render it wider by pushing against the Extremity of it. Wherefore they will have the *Præputium* to be brought over the *Glans*, with the fore and middle Fingers, as I have said, whilst the *Glans* is repelled with both Thumbs, to restore it to its natural Situation.

It is true, that in the Constriction the *Glans* is very much swelled and very hard; but notwithstanding its Hardness, if it be as strongly repelled as is necessary, its Extremity will come nearer the Circle of the *Glans* and widen it. Tho' it grew wider but by one Line, it would be still sufficient to prevent the Reduction.

WHEREFORE, in order to reduce the *Glans*, the Surgeon must lessen its Bigness, by drawing it longer. Mr. *Petit* does it with a Fillet split in the Middle, which he applies about the *Glans*, like an unitive Bandage. Afterwards, he brings the *Præputium* nearer, in the manner above-mentioned.

IF that Method, tho' very ingenious, cannot succeed, a prudent Surgeon should not leave the Patient, before he has performed the Operation, that is proper in that Case, in order to bring the *Præputium* to its natural Place. But the Patients are always afraid of Incisions, and will not allow of them 'till they know there is no other Remedy.

THE Surgeon must therefore empty the Vessels, and relax the great Distention; which may be effected by frequent Phlebotomy, and the Application of emollient Poultices. But he must observe, that in all those Diseases the *Penis* ought not to hang down; for by that means the Inflammation and Distention are frequently increased. The Surgeon must therefore use a *Suspensorium*, which is a compounded Bandage,

Bandage, and keep the *Penis* fastened to one of the Groins with a Scarf, which is nothing else but a Compress somewhat long, tied to a Girdle; taking care to remove the *Penis* now and then from one Side to the other, for the Ease of the Patient.

Two or three Hours after, the Surgeon takes off that Dressing, wipes the *Penis* very clean, and makes a new Trial to reduce the *Præputium*: And if some Applications of those Remedies prove ineffectual, he must necessarily proceed to the Operation, about which Authors differ, as I have already said; some making Scarifications in one Place, and others in another.

WHEN I had under my Care the two *Paraphimoses* above-mentioned, I made Scarifications with a Lancet, according to the usual Method. There came out but four or five Drops of a limpid and reddish Serosity; and I perceived at the opening of every Scarification a very transparent Body, like a Jelly; and the Fingers with which I held the Lancet, felt a small Noise, when I cut that Body. Considering that the Incisions, I had made, did not at all relax the Constriction, I thought, some Suppuratives, resolving that transparent and congeal'd Body, might unbend the *Penis*, and facilitate the Reduction of the *Præputium*. But I was surpris'd to see the next Day the *Glans* more distended and inflamed, and the Scarifications dry and contracted. I had recourse again to Phlebotomy, and the strongest Emollients, which removed the Tension at last, and brought back the *Præputium* to its natural Situation, without the Assistance of my Hand.

SOME Surgeons seeing the Bigness of the *Glans*, and being sensible that its Head prevents the Reduction of the *Præputium*, are for making Scarifica-

tions round the *Glans*, to empty it, and to facilitate the Operation by that means.

THAT Notion appears specious; but a Surgeon well acquainted with the Nature of the Disease, will plainly see that the Distention of the *Glans* being only occasioned by the Constriction of the *Præputium*, it would be in vain to pretend to cure the former, before he has removed the latter. Besides, if he considers the Structure of the *Glans*, and is fully convinced that it is of a spongy Texture, which cannot be distended without being full of Blood, he will by no means make Scarifications upon its Head.

IN order to perform the Operation of the *Paraphimosis*, Mr. *Petit* takes a *Bistouri* somewhat crooked: He conveys that Instrument, (its Back being turned towards the *Penis*,) between the *Penis* and the *Præputium*, under the Constriction and the Furling of the *Præputium*, and raising the Point of the *Bistouri*, and lowering the Wrist, he cuts the first Furling: He cuts likewise the second, the third, and the fourth, if there are any; in a Word, 'till the whole Constriction be removed; which he knows, when he feels no longer a transverse String; and then the *Præputium* is more moveable.

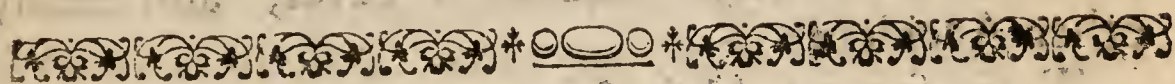
IF the *Frænum* it self is very much distended, and constrains the *Penis*, Mr. *Arnaud* advises to cut it, without fearing any thing.

THE Surgeon washes the *Penis* with warm Wine, and reduces the *Præputium*, which is easily performed. Afterwards, he makes an Embrocation with warm Oil of Roses upon the *Penis*, in the Groins, and upon a Part of the Belly. He applies upon the *Penis* a Plaister of

cut with two Heads, that it may be more easily adapted to the *Penis*. He lays over that Plaister a
small

small Compress of the same Figure, and dipt in a proper Liquor. He covers those two Pieces with a small and single Compress, made in the form of a Cross of *Malta*, with a Hole in the Middle for the Passage of the Urine; for this last Compress must be applied immediately upon the Extremity of the *Penis*. He supports the Whole with a Fillet, cut at one End, according to its Length, to form two small Heads. Now he must put the above-mentioned *Suspensorium* and Scarf of the *Penis*, and tie them to a Girdle supported by a Napkin doubled in three Folds, according to its Length.

It is not improper to make the following Days Injections between the *Præputium* and the *Glans*, with warm Wine, &c.



CHAP. XXIV.

Of the Fistula in Ano, and Abscesses, which happen in that Part.

THE *Fistula* is so called, because it has a long and narrow Cavity, like that of a *Flute*.

THE general Definition of a *Fistula* is, an Abscess, whose Bottom is much larger than its Orifice, commonly attended with a Callosity, and from which an acrimonious and ferous Matter flows.

A *Fistula* is always a Consequence of an Abscess, and consequently it may happen almost in every Part of the human Body, especially in those Parts, that are very fat, or imbibed with Humours.

SINCE a *Fistula* is the Consequence of an Abscess, it follows that whatever can produce an Abscess, will be the true Cause of a *Fistula*.

THE *Anus* is subject to two Sorts of Abscesses. The first happens all of a sudden; and the second, called the *Fistula in Ano*, is formed slowly.

THE first Abscess begins with a Kind of Tumor, which grows very considerable, and occasions a great Disorder in a short time.

IT begins at first by a small Tumor, very hard, and not bigger than the Finger's End. That Hardness is very deep, and surrounded with a Redness: It frequently happens that nothing is to be seen in the Skin but an *Erysipelas*, the Heat whereof is so great, that in four and twenty Hours it will produce an Abscess, whose Consequences will prove dreadful, unless they be timely prevented. The Pains which the Patient feels, are so sharp and so violent, that they occasion a Fever, and many other Accidents.

THE second Abscess is particularly known by the Name of *Fistula*.

A *Fistula* is formed more slowly: It begins with a Redness without a Tumor; but the Patient feels a Pain, and the Surgeon perceives a Hardness. The Tumor appears in process of Time, and at last it surrounds a whole Side of the *Anus*.

WHEN the Abscess is formed, the Accidents seem to be over, and the Matter striving to come out, pierces the Intestin rather than the Skin, because the former is more tender, and makes less Resistance than the Skin, which is of a close and firm Texture. But because the Disease encreases daily, the Matter which grows more and more corrosive, daily makes its Way through new Passages on the Right and on the Left, and the Skin is pierced by one or many small Holes, out of which a serous Matter flows.

It appears from this Description, that the *Fistulas in Ano* are of different Figures, according to their different Degrees of Malignity and Growth; and therefore they have been called by different Names, according to their different Kinds.

THERE are in general two Sorts of *Fistulas in Ano*, a compleat one, and one that is incompleat. The compleat *Fistula* has two Orifices, one in the Intestin, and another in the Skin.

THIS Sort of *Fistula* is known by conveying a Stilet, with a Button at the End of it, into the external Orifice, and the fore-Finger into the *Anus*; and if the Stilet be felt with that Finger, there is no longer any Reason to doubt of there being two Orifices.

THE incompleat *Fistula* has but one Orifice, either in the Intestin, or in the Skin; and from that Difference it receives different Names.

IF the *Fistula* opens into the Intestin, and no Orifice happens outwardly, our modern Operators call it blind, and internal. On the contrary, they call it blind, and external, if it opens outwardly, and has no Orifice in the Inside.

A Surgeon knows that there is a *Fistula* of the first Kind, when the Patient feels a Pain, and a Sort of Heat in the *Anus*; when the *Anus* is red and excoriated, if the *Fistula* is somewhat old; and when the Patient has an Itching, and consequently a Desire of going to Stool; And if the Surgeon conveys his Finger into the *Anus*, he will know that there is an Orifice by reason of its Unevenness.

THE Tumor which appears outwardly, attended with a small Inflammation, in which a kind of Fluctuation is sometimes felt, and the *Pus* coming out with and after the Excrements, are a further Sign of

of an Ulcer near the *Anus*, which opens into the Cavity of the Intestin.

It is no very difficult thing to explain all those Symptoms; and it may be said that the Salts of the Matter, if gross in any the least Degree, will stimulate the Intestin, &c. which will be attended with Pain, and the Heat and Redness will be the Consequences of the Compression of the Vessels, that surround the Ulcer. The Excoriation can only proceed from the Effusion of the *Pus*, the gross Salts whereof bruise and tear those Parts on which they pass. The Fibers of the Intestin being thus torn, there will be a Reflux of the Spirits towards the Brain, that will be quickly attended with an Influx of the same Spirits towards the affected Part; and consequently the Patient will have an Itching, and a Desire of going to Stool, which is called a *Tenesmus*, &c.

THE Signs, by which we know the second Sort of *Fistulas*, called blind and external, are very plain, since we see an Orifice outwardly, and it appears by the Probe that there is none inwardly.

THE Matter of the Ulcer may likewise corrode on all Sides, and open new Passages in the Circumference of the Ulcer, which are called by the Operators *Sinus's*. The Surgeon may know them by the Probe, the Plenty of Matter, and its different Alterations.

C H A P. XXV.

Of the Operation of those Abscesses, which happen in the Anus.

BEFORE I explain the Method of performing that Operation, I must observe that it will not be improper to advise the Patient to make Water, in order to empty the Bladder, which the Operator might otherwise be apt to pierce. Besides, those upon whom that Operation is performed, do not generally make Water but eight or nine Hours after; and if the Bladder was full, it would be very troublesome. The Patient must be told of it, that he may not be surpris'd, if he cannot ease himself by the coming out of the Urine.

CARE must also be taken to make him go to Stool; and to that End, he must take a Glister one or two Hours before the Operation, to dilute the Matters contained in the Intestin, and to force 'em to come out. And because the *Rectum*, during the Operation, suffers an Irritation, which makes the Spirits flow back towards the Brain, and that Reflux is quickly attended with an Influx towards the Intestin, the Patients have a Kind of *Tenesmus*. But because they generally void no Excrements, they must not be suffered to go to Stool.

BESIDES those Precautions, the Surgeon must also take care to put the Bandage, that he may not be obliged to stir the Patient after the Operation, for the Reasons to be mentioned hereafter. Mr. *Arnaud's* Bandage does fully answer our Intentions. Here follows a Description of it.

THE

THE Surgeon folds a Napkin in four Folds, and applies it about the Body of the Patient, like a Girdle. He supports that Girdle with a Scapulary, split only in the Middle, and as much as is necessary to leave a Passage open for the Head. He sows that Scapulary to the Girdle behind, and in this last Place, he sows three or four Fillets, which will be of Use.

AFTERWARDS he takes a List of five or six large Finger's Breadth, and about an Ell long: He cuts it into two, according to its Length, excepting eight or ten Inches of it, at one of the Ends, to which he must sow three or four small Fillets, that will serve to make Knots behind, with those that are already sowed to the Napkin and Scapulary: And by this Method the Surgeon will be able to change the Bandage as often as he pleases, and to straiten it, without stirring the Patient.

THE fixed Point of the Bandage is directly over the Shoulders; which makes the Excellency of it, because the Bandage being fast, does very much compress the Dressing.

THE next thing is to place the Patient in a proper Situation, in order to perform the Operation rightly and safely. All Authors advise to lay him down upon the Edge of a Bed, and to put a Bolster under his Belly, in order to raise his Buttocks, which must be turned towards the Light.

THOUGH that Situation seems to be a proper one, yet it is liable to some Inconveniencies, which prevent the Safety of the Operation. For if the Surgeon opens some considerable Vessel, upon which he cannot make a Ligature, nothing but the Compression can stop the Blood. And if the Surgeon stops it with some Pieces of Linnen or Lint, and fastens

fastens the Bandage; that Compression, when the Patient is put to bed, will change its Place, and the Vessel will afford more Blood than ever.

IN order to avoid that Accident, Mr. *Mery*, Mr. *Arnaud*, Mr. *Petit* and Mr. *Thibaut* advise to bring the Patient to the Edge of his Bed, to lay him down upon his Side, having his Buttocks prominent and his Thighs somewhat bent, lastly in a Situation not unlike that of a Person, who takes a Glister in Bed.

THE Dressing being applied in that Situation, and the Bandage well fastened, the Patient does not change his Attitude: He only moves forward in his Bed; and the first Motion he makes to lie more easy, is stretching his Legs, whereby the Bandage is still more straitened; and the Vessel more strongly compressed.

LET us proceed to the Operation of the inflammatory Abscesses, which happen in the *Anus*.

THOUGH the Surgeon touches outwardly a small Tumor very hard, under which he feels no Fluctuation, yet he must not stop there; but he must convey his fore-Finger to the Edge of the *Anus*, or Orifice, and feel that Part, where he suspects the Abscess may lie: And if he feels a Hardness every where, he applies upon the Tumor a maturative Poultice.

THE Surgeon must not leave the Poultice very long upon that Sort of Tumor, the Abscess is quickly formed; for should he leave it on till he felt a Fluctuation on the Out-side, the Abscess would occasion so great a Disorder, that it would be incurable.

THE Operator must therefore take off the Poultice two or three Hours after he has applied it, wipe the Skin and his Fingers, and convey again the fore-

fore-Finger of one Hand to the Edge of the *Anus*, or its Entrance, and the fore-Finger of the other Hand upon the external Tumor ; that with the Help of those opposite Motions he may be satisfied whether there be any *Pus*.

AT that very time he must thrust a Lancet into the Middle of the Hardness, which appears outwardly, without taking off his Finger from the Inside of the *Anus* ; and he must thrust the Lancet to the very Place, where he thinks the Abscess lies. There he makes a small Motion, by raising the Point of the Lancet.

AND because the *Pus* lies always very deep in those Phlegmons, and a great deal of Blood always comes out, which mixing afterwards with the Matter of the Abscess, makes the Standers-by believe that the Surgeon has opened the Part, before the Abscess was ripe, and consequently before there was any *Pus* ; Mr. *Arnaud*, that great Surgeon, advises to put a Spoon under the Lancet, and to press the Tumor a little, to make a little Matter come out thro' a small Out-let left open under the Lancet, by drawing it back a little, and lifting it upwards from the Point, to make room for some small Quantity of Matter to issue out ; which is a Precaution a Surgeon ought to take in all the Abscesses he is obliged to open, that he may by that means secure his Reputation from Calumny, and the Ignorance of the Vulgar.

THE most learned Surgeons in *Europe*, whom I quote so often, and whose Disciple I am proud of being, could not avoid that Calumny, and have frequently performed those Operations in the Presence of certain Surgeons, who were grown old in their Profession. As soon as the latter saw the Blood, they condemned our Operators, and told them in a reproachful

proachful Manner, that they were very fond of cutting without any Necessity.

WHEN the Surgeon has drawn a sufficient Quantity of *Pus*, to shew that he is in an Abscess, he withdraws his Lancet, cutting still in a strait Line what happens to be over its Edge. Afterwards, he puts his Finger into the Orifice, to dilate the Seat of the Distemper; which he can easily do, because the *Pus* has occasioned a Vacuity in that Place. And without taking off his Fingers from the Inside of the Abscess, he conveys by their Means Scissars or a *Bistouri* blunt at the End, to enlarge the Orifice according to its Length, I mean, by going along the *Anus*.

THE Design of a good Surgeon being to make the Bottom of an Ulcer very narrow, and its Orifice very wide, he must not be contented with that first Incision; and to answer perfectly all the curative Indications, he must make two other Incisions cross-wise, taking Care to remove with Scissars pointed at both Ends, and with a *Bistouri* all the hard and callous Bodies.

To dress that Sort of Abscesses the Surgeon puts in three or four large Tents tied with a Thread. He puts the first Tent at the Bottom of the Abscess, and places the Thread at one of the Angles, where he must remember that the first Tent lies. He does the same with the others, and puts their Threads in a certain Order out of the Wound, that one may say the next Day, this is the first, this the second, &c. But because those Threads may be disorder'd, it will not be improper to make them of different Colours, or to distinguish them by several Knots. All those Precautions are necessary, that the Surgeon, when he removes the Dressing, may not take off the first
Tent

Tent instead of the last ; which might occasion an Hemorrhagy.

OVER these large Tents the Surgeon lays some Pieces of Linnen, and Lint-Dozels, raising them sufficiently, that the Compression may be greater. And before he lays the remaining Part of the Dressing, he must take care to draw a little the Thread of the first, by which Means all others will be more compressed.

AFTERWARDS, he must lay over that whole Dressing some narrow and graduated Compresses, and support the Whole with the Bandage above described ; tying the four Fillets behind the Back, and passing the two Heads between the Thighs, to tie them to the Girdle, one on each Side. And because that Bandage ought to be very tight, the Surgeon lays some Compresses in the Groins, for fear of bruising them.

HE bids a Servant hold his Hand upon the Dressing, if some Vessels are opened ; and that Servant must press towards the Vessel : To that end, the Operator is to place him right, by holding his Hand over his.

C H A P. XXVI.

Of the Operation of the Fistula in Ano.

BEFORE the Surgeon undertakes the Operation of the *Fistula in Ano*, he ought to be perfectly acquainted with the Nature of that Disease ; and because the Probe is the safest Way to know all its Complications, I shall begin with it.

IN order to probe a *Fistula in Ano*, the Patient must be brought to his Bed-side, as I have said, speak-
 ** ing

ing of Abscesses in the *Anus*. Afterwards, the Surgeon keeps the Buttocks asunder, that he may easily introduce the fore-Finger into the *Anus*, having greased it with Butter, or dipt it in Oil. For it is a general Rule, never to drive a Probe pretty far into a *Fistula*, that lies in the Circumference of the Intestin, before the Finger be in the *Anus*; because the Intestin being generally bare and destitute of Fat, the Operator would run the Hazard of piercing it in a Place lying under the Orifice occasion'd by the Abscess; whereby the Operation would become either ineffectual or more painful.

IN the next place, the Surgeon brings the Buttocks near one another; for their Distance changes the Direction of the *Fistula*, and he might think that the End of the Probe is at the End of the fistulary Channel, because he could drive it no farther; and it would be frequently stopped by an Angle occasioned in that fistulary Channel by the Distance of the Buttocks.

THE Surgeon pushes the Probe gently, with several small Motions; and if he perceives that it reaches much farther than the Finger, which is in the *Anus*, he must give over the Cure; for it would be ineffectual, and frequently dangerous.

IT would be ineffectual; because the Surgeon not being able to take out the Bottom of the *Fistula* by the Operation, it would continue to gleet, and be quickly attended with a Relapse.

IT would be dangerous; because, if the Operator, cutting beyond the reach of the Finger, should open some considerable Artery, he could no longer stop the Blood, and the Patient would quickly die.

Mr. *de la Charriere* has inserted in his Operations an Observation, which was communicated to him. I think it will not be improper to set it down here.

A Woman, says he, of fifty Years of Age had been

bled with a *Fistula in Ano* for the Space of 15 Years. The great Pains she endured, made her resolve upon the Operation. The Surgeon, a very able Man, was a long time doubtful whether he should undertake it ; because he could not find the Bottom of the *Fistula*, and was afraid of not succeeding in such a dangerous Operation. But at last, being sensible that she could not live long in that Condition, he ventured upon the Operation, of which she died nine Days after. He opened that Woman, and found that the *Fistula* had affected the whole *Rectum* as far as the *Colon*.

IF the Orifice of the *Fistula* was too small to probe, and to discover the other *Sinus's*, the Operator must use a prepared Sponge, which by distending it self, will open the Way, dilate the fistulary Passage, and enable him to see all the Cavities.

IF the Orifice, which appears in the Skin, makes a Constriction, which cannot yield to the Sponge, as it may happen by reason of the close Texture of the Skin, the Surgeon must dilate it with a *Bistouri* ; for all possible care ought to be taken to have a perfect Knowledge of the Disease. According to this Notion, we shall place the Patient in many different Situations ; for though I have said, that lying upon the Bed-side is the safest Situation for the Operation, yet I don't deny but other Situations may help us to find out some new Cavities.

IF the external Orifice of a *Fistula* should appear upon the Buttock, I mean, if it was at a great Distance from the *Anus*, and if the Surgeon should perceive by the Stilet, that the Canal goes sloping towards the *Anus*, and somewhat superficially ; lastly, if the Stilet stop all of a sudden, the Operator has good Ground to believe, that the Seat of the Disease does not lie there, he must, without losing any Time, take a Probe

grooved

grooved and open at the End, which may serve for a moment instead of the Female-Conductor, and convey it upon the Stilet, which on this Occasion imitates the Male-Conductor. And when the grooved Probe is at the End of the Stilet, the Surgeon must take off the latter, and turn the Groove of the Probe towards the Skin, to convey into its Groove Scissars or a *Bistouri*, in order to cut whatever happens to be above it. Afterwards, the Surgeon dresses that Wound, dilating it very much ; and the next Day he comes to work again, to examine the *Fistula*, as I have just now said.

THIS Method ought to be used in those fistulous Abscesses, that have a small Orifice, which must be dilated. Tho' it has been lately proposed, yet we are indebted for it to Mr. *Arnaud* : He is the first Inventer of grooved Probes, opened at the End, and the first who compared them to the Male-Conductors in that Sort of Wounds.

WHEN the Surgeon is thus thoroughly acquainted with the Nature of the Disease, he must resolve upon the Operation. In order to perform it, he ought to remember all the Circumstances, which I have mentioned, speaking of the Abscess in the *Anus* ; and having purged and blooded the Patient several times, &c. he must bring him to the Bed-side, as I have said above.

THERE are two Ways of performing the Operation. The first consists in conveying a Stilet into the external Orifice of the *Fistula*, and so out at the *Anus*, and then cutting all that lies between the *Anus* and the Entrance of the Stilet.

ACCORDING to the other Method of operating, the Surgeon conveys a grooved Probe into the *Fistula*, and brings the End of it as near the *Anus* as possible. Afterwards, he cuts with a *Bistouri* or Scissars whatever happens to be above the Groove.

THE first Method is the best, the safest, and least liable to a Relapse. But if the Intestin was pierced too far, the Surgeon must make the Incision above the grooved Probe ; because too much of the Intestin would otherwise be cut off.

WHICH Way soever the Surgeon performs that Operation, he must always make the external Incision much larger than the Bottom of the Sore ; and if he resolves to use the Stilet, he conveys the fore-Finger, greased or oiled, into the *Anus*, and with the other Hand he introduces the Stilet into the *Fistula* ; and when he finds with the Finger and Stilet that Part of the Intestin, which is pierced, he must make another Hole in it with the Stilet, somewhat above the Hole occasioned by the Disease. Afterwards he must convey a little the Stilet into the Intestin, directing it with the Finger that is in the *Anus* ; and without quitting hold of the Stilet, he bends it to make it come out in part through the *Anus*, and to form by that means a kind of Loop which he must not draw too much, for fear of tearing the Intestin.

AFTERWARDS, he takes both Ends of the Stilet, that come out ; and with a *Bistouri* somewhat crooked, the Blade whereof is fastened to the Handle with a Fillet, he cuts and takes off whatever is contained within the Loop of the Stilet.

AFTER that Operation, the Surgeon must wipe the Blood, and see whether he can discover and open some other Passages. Afterwards, he conveys his Fingers into the Wound, to feel the Hardness and Callosity. Mr. *Arnaud* takes off Part of it with the *Bistouri* ; and then with pointed Scissars, conveying them into the Callosity, to scarify it, and promote a more speedy and plentiful Suppuration. Mr. *Petit* affirms that the Callosity may be cut, by drawing it with an Instrument.

strument. In the next place, the Surgeon cuts the Bridlings he meets with, putting his Finger into the Wound, and uses Scissars blunt at both Ends, for fear of pricking it. In order to cut those Bridlings, the Operator must not look for them towards the Intestine; for the Intestine having many Folds and Wrinkles, there would be no cutting them. He must therefore look for, and cut them towards the Tuberosity of the *Ischion*. If he opens some Vessel accidentally, he must make a Ligature, if he can, taking care not to draw the Vessel towards himself; for he would cut it: Or else he shall use the Stiptick and the Compression.

IF the Surgeon does not make a new Hole in the Intestine with the Stilet, and conveys that Instrument into the Hole occasioned by the Disease, he must cut the Intestine upon his Finger one or two Lines above the *Fistula*, to remove all the Callosity.

BEFORE the Surgeon makes an end of those Operations, he must always remember to make the Entrance of the *Fistula* larger than the Bottom: According to that Principle, he shall cut all the Fat imbibed with the corrosive Salts of the *Fistula*; and the Disease will be more speedily and more safely cured.

TO dress a *Fistula in Ano*, where 'tis necessary to compress some opened Vessel, the Surgeon lays upon the Opening of the Vessel a small Dozel dipt in the Stiptick, and afterwards squeezed. Then, he puts very far into the *Anus* a large Tent very long, and very large, especially at its Head, and tied in that place; so that it may reach much further than the Bottom of the *Fistula*, I mean, get into the Intestine beyond the *Fistula*; because, when it does not reach farther than the Bottom of the *Fistula*, it presses there that Part of the Intestine which is opened, and a Furl

is there formed, which remains always callous, and occasions new *Fistulas*. Mr. *Arnaud* teaches us that Theory, which is grounded upon his Practice, and tells us, the Tent ought to be narrow at the end, that it must reach beyond the *Fistula*, and grow much larger towards its Head, the better to compress the Circumference, and to keep the Orifice of the *Fistula* very much dilated.

THE Tent being introduced into the *Fistula*, with the Circumstances just now mentioned, the Surgeon pushes it over the small Dozel, that lies upon the opened Vessel, and he puts on the Side opposite to the Opening of the Vessel, some Dozels between the internal Surface of the *Fistula* and the Tent, that he may drive the latter towards the affected Part, make by that means a stronger Compression, and stop the Blood more easily. He also puts some Dozels in the whole Circumference of the Tent; and to make a greater Compression, he may, as Mr. *Petit* says, withdraw a little the Thread of the Tent, and consequently the Tent it self; whereby the Dozels will be still more compressed.

HE fills up the Interval of the Buttocks with narrow and graduated Compresses, and supports the Whole with the same Bandage, which I have described for an Abscess in the *Anus*, bidding a Servant lay his Hand upon it for some time, by reason of the Hemorrhage.

SINCE the Design of a Surgeon is to prevent the too speedy Growth of the Flesh, and to lessen the Bottom of that Wound before the Entrance, it follows that in all the Dressings, he ought to fill it well with Tents; and consider, especially the ten or twelve first Days, whether he perceives any *Sinus* untouched, or formed since the Operation: This he will know

first

first by the Sight, and secondly by the *Pus*, which will have the same Consistence and Colour, without any Diminution of its Quantity. On the contrary, if the *Pus* grows white from the good Consistency of it, if it has no ill Smell, and is in less Quantity, it will be a good Sign.

LASTLY, when the Flesh grows on all Sides, and it appears from the small Quantity of Matter that the Wound wants to be cicatrized, the Surgeon introduces into the *Anus* a Lint-Tent suitable to the Bigness of the *Anus*, and a Finger long. He covers it with *Pompholix*, which is a good Drier; and when he perceives all along the Tent a Rivulet, as it were, formed by the running of the Matter, it is a Sign of a speedy Cure.



C H A P. XXVII.

Of the Wounds and Abscesses of the Breast in relation to the Empyema.

HAVING discoursed of the Diseases incident to the several Parts of the *Abdomen*, and described with all possible Accuracy the Operations proper for them; to follow the Order, that is observed in anatomical Demonstrations, I must proceed to the Diseases of the Breast, which require a chirurgical Operation. And without losing any Time about the Etymology of the Word *Empyema*, I shall say that we mean by that Word an Opening made between the Ribs, to let out the Blood, the *Pus*, or the Water diffused in the Breast..

THE Blood can not be diffused into the Breast, but

by the opening of some of its Vessels; which is generally occasioned by a Wound's penetrating into that Cavity.

THE Wounds of the Breast, as well as those of the *Abdomen*, are either simple or complex.

SIMPLE Wounds are those that are attended with no Accident, and require only a speedy Re-union for their Cure. On the contrary, Wounds are said to be complicated, when they are attended with many Accidents. Among the latter, those that penetrate into the Breast, and open some Vessels, require a very particular Care, and a great deal of Skill in the Surgeon, since they cannot be cured without a Counter-Opening, which we call the Operation of the *Empyema*.

IT is frequently very difficult to know whether the Wounds of the Breast be penetrating, or not; and that Difficulty makes those Wounds more dangerous in process of Time, because Surgeons are too curious to find out whether they penetrate into the Breast, or not. That great Exactness is most times the Cause of the great Complication of the Wounds of the Breast, tho' they were very simple before.

SOMETIMES Wounds appear to be very simple, and even to pierce only the Teguments, tho' they are very much complicated, and tho' they penetrate into the Capacity, and even open considerable Vessels.

I suppose, for instance, that a Man has been wounded with a cutting Instrument, which has penetrated into his Breast, and that he held up his Arm at that Time. If in such a Posture, the Instrument had pierced the pectoral Muscle, and got into the Breast, when the Patient puts his Arm in a natural Situation, the pectoral Muscle fastened to the *Humerus*, which followed it when stretched, would be obliged to descend
also,

also, and its Fibers would hide the Opening of the Breast in such a Manner, that the Surgeon would only find a simple Opening in the Teguments, and cure it as a simple Wound, though it would be very much complicated. Wherefore, in order to probe and examine that Sort of Wounds, the Patient must be put in the same Situation as when he was wounded.

THE Patient being placed conveniently, that the Surgeon may find out where the Wound lies, the Probe or the Finger will remove all Doubts, and discover to us whether it be penetrating, or not. Besides, if the Wound penetrates into the Breast, and the Passage of the internal Air is a little constrained, there will be an *Emphysema* in the Circumference of the Wound, which will grow the more considerable, as the Air continues to come out, and to insinuate itself into the Intervals of the Muscles, and the fat Cells.

IF the Instrument passed from one Side to the other, and cut the *Pleura* and the intercostal Muscles, the Patient is almost stifled, and feels a great Pain in that Place: There is an *Emphysema*, distinguished from the *Oedema* by a kind of cracking Noise, when 'tis touched: The Impression of the Finger does not remain as in the *Oedema*; and the Skin does not change its Colour the first Days; or if it be altered, 'tis only in time, and it grows blackish by reason of the Blood that is diffused; and in the *Oedema*, it continues to be shining and bent.

THE frothy Blood, that comes out through the Wound, and the Air attended with a small Noise and Whistling, are also certain Signs that the Wound penetrates into the Stomach, and that some of its Parts are affected.

WHEN

WHEN the Surgeon knows, without tormenting the Patient too much, whether the Wound penetrates, and when he perceives no dangerous Accidents, he must go about to cure it as a simple Wound, dress it gently and carefully, and prevent the Air, as much as possible, from getting into the Breast. He is to blood the Patient, and nourish him only with Broth the first Days; and if there be no Effusion, the Patient will be cured by that Method.

ALL good Practitioners are agreed that the Complication of the Wounds of the Breast proceeds from the opening of large Vessels, the two great Exactness of the Surgeon, and his wrong Way of dressing.

THERE is a twofold Effusion of Blood: The one proceeds from the external Vessels, and the other from the internal.

THE Effusion of Blood upon the Diaphragm is attended with a very great Difficulty of breathing: The Patient feels a very painful Heaviness upon the Diaphragm, especially about the false Ribs; and if he be sitting, the Situation of the Body being then perpendicular, all the Blood runs into the Diaphragm; which hinders its Motion, and consequently encreases the Difficulty of breathing.

IF he lies on the Side opposite to the Wound, he will feel a Pain and a Drawing all along the Middle of the Breast: He will be very uneasy, and hardly able to breath. These Symptoms will be the Consequence of a Liquid, which compresses the *Mediastinum* very much. Lastly, the Side of the Wound will be inflamed and distended, and the Patient will frequently fall into a Swoon.

IF the Lungs should adhere to the *Pleura*, (which may be known by the Probe and the Finger) and if the Effusion was in the Lungs, and its Cells were full
of

of Blood, the Difficulty of breathing would not be so great as in the Effusion upon the Diaphragm ; but the Patient would now and then feel Suffocations, especially when he stirred, and if the Wound of the Teguments was parallel to that of the Lungs, the Blood would easily come out of it, and the Patient would spit a little Blood ; but if the Blood should come out with Difficulty thro' the Wound, the Patient would spit Blood every Moment;

THE Prognostick of the Wounds of the Breast is more or less dangerous, as they are more or less complicated.

IF the Effusion be considerable, and require frequent Dressings, 'tis a very bad Sign ; for it appears from thence, that the opened Vessels are large ; and if the Patient is eased for a Moment, when he is dressed, because the Breast is emptied by every Dressing, it may be said that he loses a great deal of his Strength by it, and will die upon that Account.

ON the contrary, if little Blood comes out of the Wound, and the Effusion does not require frequent Dressings, one may very well hope for a Cure.

THE Danger depends also upon the Situation of the Wound. For Instance, the Wounds of the upper Part are more dangerous than those of the lower ; because all the large Vessels are in that Place, and the Instrument cannot penetrate into it, without opening some, and Death presently ensues. The Wounds of the hinder Part, for the same Reason, are not less dangerous.

WHEN the Wounds of the Breast are attended with a great Pain, a Fever, and an Inflammation, 'tis a bad Sign.

THE Wounds of the Breast made with Fire-Arms, are very dangerous, when they affect some large Vessels.

LASTLY,

LASTLY, those Wounds, wherein there is an Adherence, are more easily cured than others, provided no large Vessel be opened.

IF the Wound of the Breast with an Effusion upon the Diaphragm lies in a Place, that may facilitate the coming out of the Blood, the Surgeon must only observe whether the Wound is large enough to let out the diffused Liquid. If it be too narrow, as a Wound occasioned by a Thrust with a Sword, he must dilate it by putting into it a grooved Probe, and conveying it near the intercostal Muscles, and above the Groove he must cut with a strait or crooked *Bistouri*, &c. Afterwards, he places the Patient in such a Situation, that the diffused Blood may be discharged into the Wound, and come out easily; and whilst the Patient is thus situated, the Surgeon bids him stop his Nose, and keep in his Breath, that the Lungs being full of Air, may drive the Blood through the Wound.

INJECTIONS are also used; but they ought to be very gentle, for fear of occasioning a Cough, which would trouble the Patient. Those Injections must also be warm; and the Surgeon must keep the Room shut, correct the Air with Fire, and then proceed to the Dressing, as I am going to shew, speaking of the Operation of the *Empyema*.

IF the Wound lies in the upper Part of the Breast, and it appears by all the Signs abovementioned that there is an Effusion of Blood upon the Diaphragm, it must be let out by a Counter-opening, as I shall say, after I have explained the Signs of an Effusion of the *Pus* in the Breast.

MR. *Verduc* describes those Signs so well in his Operations, that I shall set down here what he says upon that Subject.

“WE know, *says he*, that an Abscess is forming
“in the Lungs or in the *Pleura*, when the Peripneu-
“mony or the Pleuresy are not cured by the usual
“Remedies, and when those Diseases have lasted a-
“bove fourteen Days without any Sign of a Dis-
“charge by spitting, sweating, Stools or Urine; for
“it must be expected that the Abscess will be formed
“within the twenty-fifth, or thirtieth Day of the
“Disease, sooner or later, according to the Strength,
“Age, and Constitution of the Patient, the Violence
“of the Disease, and the Time of the Year.

“WE know that the Abscess is formed, when
“without any of those usual Evacuations just now
“mentioned, the Fever, the Pain, and the other Ac-
“cidents abate, and disappear for a time, and the Pa-
“tient finds himself eased, and less oppressed. But
“if soon after, the Pain and the Oppression return
“tho’ in a less Degree; or if the Fever returns,
“increases, and is frequently attended with irregular
“Shiverings, with a Cough; or if the Patient sweats,
“especially in the Night; or lastly, if the Pain grows
“heavy and grievous, all those Symptoms denote an
“Abscess.

“WE know that ’tis an Abscess between the two
“Folds of the *Pleura*, when the foregoing Symptoms
“have been violent, for Instance, when the Fever has
“been very sharp, the Pains very smarting, and the
“Cough very dry without spitting any thing; which
“at the same time makes the Respiration painful; and
“if the Lungs suffer, the Fever before the Abscess is
“not so great, the Pain is duller, and the Oppression
“greater, though the Respiration be less painful, and
“the Cough more violent and more frequent: The
“Patient spits Blood, or *Pus*, &c. very often: He is
“ill-humoured, when he coughs and spits. We
“know

“ know, the Abscess to be in the Cavity of the Breast,
 “ when the Patient feels a painful Heaviness upon the
 “ Diaphragm, especially about the false Ribs, and did
 “ not complain of it before: When he spits, and
 “ feels that the Heaviness of the Diaphragm, and
 “ consequently the Difficulty of breathing encreases.

“ If the Patient lies on that Side, in which he al-
 “ ways felt a Pain, he will find himself eased; but if
 “ he lies on that Side, which was not affected, the
 “ Matter we suppose to float in one of the Sides
 “ of the Breast, will lie upon the Mediastinum, and
 “ occasion there violent Pains, and a great Difficulty
 “ of breathing.

“ IF the Effusion be on both Sides, the Patient
 “ cannot lie upon any Side, but the Accidents just
 “ now mentioned will happen. The most conveni-
 “ ent Situation for those Patients is to lie down up-
 “ on their Backs: They cannot sit without feeling a
 “ Pain and Heaviness upon the whole Diaphragm, and
 “ they are stifled in that Posture, being hardly able
 “ to breath, unless the diffused Matter be very in-
 “ considerable.

“ THE Signs of an Effusion of Water in one, or
 “ in both Sides of the Breast, are altogether the same
 “ as those of an Effusion of Blood: They are only
 “ distinguished by the foregoing Symptoms: If the
 “ Dropsy, for Instance, was only preceded by a slow
 “ Fever, 'tis then but seldom that there is any Wa-
 “ ter in the Breast without a Fever, or some other
 “ long Disease; whereas the Abscess was preceded by
 “ an acute Fever with a Pain in some Part of the Breast.
 “ Besides, the Dropsy of the Breast is attended with
 “ Thirst, and a dry Cough; the Face is pale, and
 “ sometimes bloated, the Legs and Feet swell a little;
 “ the Patient has a slow Fever, and when he stirs ve-

“ry much, or all of a sudden, he hears sometimes a
 “Fluctuation in the Breast, much in the same Man-
 “ner as when a Bottle half full of Water is stirred.”



CHAP. XXVIII.

Of the Operation of the Empyema.

BEFORE the Surgeon begins that Operation, it is not improper to know whether it be useful, or needless. For Instance, if the Wound lay in the lower Part of the Breast, and gave a free Passage to the diffused Blood, it would be needless to perform the Operation, since the only Design of the Surgeon is to let out the Blood, or the purulent Matter.

IF the Wound was in the upper Part of the Breast, and some large Vessel was opened, affording a great deal of Blood, as may be known by the Blood, that comes out of the Wound almost continually, without any Ease to the Patient, in such a Case the *Empyema* would be useless.

IF the Effusion of Blood or *Pus* was only in the Lungs, which may be known by the Signs above-mentioned, 'tis plain the Opening of the Breast would be of no Use to that Disease, unless the Abscess was superficial, and the Lungs adhered to the *Pleura*.

THE Surgeon being well informed of the Consequences of the Disease, both from his own Knowledge, and that of others, ought to let out the Blood, or *Pus*, which we suppose to be diffused upon the Diaphragm. In order to it, he must open the Breast in a Place from whence the Fluid may be discharged, and easily come out. The most convenient Place is
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the hinder and lower Part of the Breast, between the third and fourth false Ribs, reckoning from the lower Parts up to the superior, at the Distance of five or six Inches from the Spine.

THE Operator must not open the Breast nearer the Spine, because before he could come to the Ribs, he would find many Tendons of the Muscles of the Spine, especially the Tendons of the *Sacro-lumbarius*, which adhere to the Angle of each Rib; and the Cutting of those Tendons would be very painful, to say nothing of the Trouble they would give to the Operator.

BESIDES, if he should open the Breast so near the Spine, he would infallibly cut the intercostal Vessels, which are not yet in the *Sulcus* of the Rib, since it begins to appear only at its Angle. Lastly, the small Interval between the Ribs, from their Angle to the Spine, does not allow the Operator to open the Breast there, since that Operation would not be attended with good Success. It may therefore be performed at five Inches Distance from the Spine, but the Breast ought not to be opened much farther, for fear of hurting the Diaphragm.

IF the Patient be lean, the Surgeon cannot be mistaken in telling the Ribs, provided the Patient be made to lean back, in order to relax the Muscle called the great Dorsal: But if the Patient be fat, or the *Emphysema* very considerable, good Practitioners advise us to bend the fore-Arm of the Patient, to put his Hand near the *Xiphoid* Cartilage, and in that Situation to look for the lower Angle of the Shoulder-blade: When the Surgeon has found it, he takes its Measure four Inches under that Angle, and at five or six Inches Distance from the Spine, as I have said; and then he will be in the true Place where the Operation ought to be performed.

AFTER-

AFTERWARDS, according to Mr. *Arnaud's* Prescription, he pinches in that Place the Skin, the Fat, and the dorsal Muscle all at once, in order to perform the Operation more speedily, and preserve the Patient from Pain.

THE Surgeon bids a Servant do the same, (supposing the Patient to be still reclining back) and then cuts with a strait *Bistouri* all the Parts just now mentioned, by an Incision about three or four Inches long.

IF the Patient was very fat, or if there was a considerable *Emphysema* in the Teguments, the Surgeon could not cut the great Dorsal with the Skin: He must therefore in such a Case be contented to cut the Skin and the Fat; and then he shall cut the great Dorsal, and dilate the Wound to discover the Ribs, and tell them easily, in order to open the Breast in their Interval.

THE Surgeon, to cut the intercostal Muscles, must place the Patient in a different Situation: Whereas he was before stretched, to relax the great Dorsal, he must now bend forwards, to keep the Ribs asunder in their hinder Part, and consequently to bend the intercostal Muscles.

THE Patient being in that Situation, the Surgeon takes with his right Hand a crooked *Bistouri*: He conveys the fore-Finger all along the Back of that Instrument, and conceals the Point of it with the End of his Finger: He pierces the Muscles, which being distended, as I suppose them to be, are easily cut: And as soon as he perceives that he is in the Cavity, he cuts the intercostal Muscles transversly; their Section, which Way soever it be made, is not considerable enough to require from the Operator that he should too much follow the Direction of their Fibers. He must make a great Opening there, without fearing to

touch the Lungs; for Mr. *Petit* affirms that as soon as the Air acts upon them, they sink, and remove from the Instrument. However, the Surgeon ought to use all the necessary Precautions to avoid hurting the Lungs.

WHEN he has made those Openings, he must observe whether the great Dorsal makes any Bridlings, and cut them. Nay, he must make some Angles in the great Dorsal, by making a transverse Incision; which enlarges the Outside of the Wound.

AFTERWARDS, the Surgeon puts his Finger into the Opening, he gently takes off the Adherences of the Lungs with the *Pleura*, if there are any: He bends the Patient on the Side of the Wound, to let out the Blood, or *Pus*; and when the Lungs appear at the opening of the Wound, he must push them back a little with a female Catheter. He must make some warm Injections into the Wound, and pump them immediately. Those of *Perficaria* are excellent; and when there is an *Empyema* by Effusion, the Injections of Marsh-mallows are preferable, if the Patient be troubled with a Cough.

To dress the Wounds, all Authors advise to put into the Opening a large Lint-Tent, firm and well tied, that it may be the better adapted to the Interval of the Ribs; and they say, it ought to be crooked at the End, for fear it should hurt the Lungs. Lastly, they pretend that this Tent will prevent the Re-union of the Wound; which would be too soon elosed up, without such a Caution.

I have sufficiently dwelt upon those Accidents, that follow the Use of a Tent, especially when I discoursed of the *Gastorrhaphy*; and I am still more unwilling to approve of it in the Breast than in the *Abdomen*, no more than the *Cannulas* of Lead.

MR. *Petit* dresses the *Empyema*, after the Operation which I have just now described, by putting into the Wound a Piece of Linnen, cut in such a Manner that it may have a kind of a Tail. That Piece of Linnen is sufficient to prevent the Re-union of the intercostal Muscles, and at the same time does not hinder the Matter from coming out continually thro' the Wound. Afterwards, he puts in a tied Dozel, and above it three or four more, and some Plagets.

IT being necessary to keep the Air, as much as possible, from getting into those Wounds, the Surgeon lays upon that whole *Apparatus* a large Plaister of *Andreas à Cruce*, which ought to be spread thick in its Circumference.

THE Opening must be closed up, when no more Matter comes out of it; and the upper Wounds of the Breast ought to be closed up as soon as possible.

THE Bandage is a Napkin folded into three, according to its Length, and applied about the Breast, and supported by the Scapulary, as I have described it, speaking of the Wounds of the *Abdomen*,

THE Abscesses by Effusion, which attend, as I have said, a Peripneumony and a Pleuresy, being sometimes contained in a Membrane, which serves as a Bag like the two Folds of the *Pleura*, or in the external Membrane of the Lungs, and being sometimes diffused upon the Diaphragm, by the Rupture which the Salts of the *Pus* have occasioned in the Bag, require indeed the Operation of the *Empyema*, but in different Places, according to the Difference of the Disease.

WITH respect to the different Places, where those Abscesses lie, we prescribe, in order to make the Operation, a Place of Choice, and a Place of Necessity. The first is only proper for Abscesses diffused up-

on the Diaphragm, and is the same with that above prescribed for diffused Blood.

BUT the Place of Necessity being known to us by the Nature of the Disease, we shall perform that Operation wherever we find an external Tumor, in which we feel the Fluctuation of a Liquid; for those Abscesses corrode the external Membrane of the *Pleura*, the intercostal Muscles, &c. get in between two Ribs, and occasion a Tumor outwardly, which opens sometimes of itself. I have seen two Instances of it. The first in a Grey Friar of *Vitré*, about seventy-six Years of Age. My Father enlarged the Opening, by putting into the Abscess a grooved Probe, and cutting upon its Groove the Skin and intercostal Muscles with a Razor, as he used to do. I dressed the Patient about six Weeks always with a large Tent, as my Father prescribed. Afterwards, a *Cannula* was put into it; and the Patient remained with a *Fistula*.

THE second Person, in whom I saw that Disease, was a privileged Surgeon of the same Town. He came to *Paris*, where he was immediately taken with a Peripneumony. The Inflammation was so great, that it took up the whole Side, with a considerable Tension. He was carried to the *Hotel-dieu* the fifth Day of his Disease, and bled eleven times in three Days by the Prescription of the Physicians of that Hospital. Notwithstanding the great Care that was taken of that Patient, an Abscess was formed in the Lungs, which appeared about the fortieth Day of his Disease, by a Tumor between the sixth and seventh true Rib, on the left Side. Mr. *Mery* ordered a Poultice to be applied to it: The Abscess broke out the very next Day, and the Patient died.

WHEN the Surgeon knows by the Signs abovementioned that there are Waters in the Breast, and when

all

all the Remedies proper for their Evacuation by other Passages prescribed by wise and prudent Physicians, prove ineffectual; the Surgeon must look for the Place of Choice already assigned, and thrust into it the grooved *Trois-quarts* of Mr. *Petit*; and if the Waters are clear, this will be sufficient for the Cure: But if there are Strings, or if the Waters appear muddy, the Surgeon must open the Interval of the Ribs, and make Injections into the Breast.

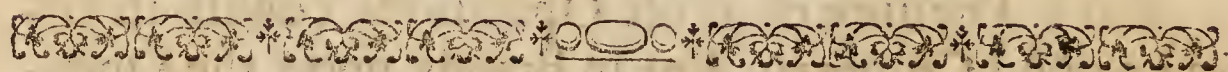
THE Dressing of those Operations consists in laying a good Compress dipt in Brandy upon the Opening, and the circular Napkin with the Scapulary, as usually.

To perfect the Cure of those Patients, upon whom the Operation of the *Empyema* has been performed, they must be blooded in the Arm, especially if the Operation was performed in consequence of diffused Blood: Afterwards, they are laid down upon their Back, the Head being a little raised, that the Fluids may easily run out.

THE Patients are dressed, when there is a Necessity for it, I mean, when they find themselves oppressed, have much ado to breath, and feel the Weight of the Fluids upon the Diaphragm, as before the Operation; so that according as those Accidents happen more or less frequently, the Dressings must be more or less repeated; for they cannot be fixed to a certain time, as in the Wounds of the other Parts.

THE Surgeon takes Care, at every Dressing, to make Injections, as I have prescribed, and to push back the Lungs with a large Probe when they appear at the Wound, and hinder the Blood or Pus from coming out. During all that Time, the Windows ought to be shut up, and the Air purified with a Fire in the Chimney, and Chafing-dishes laid even

upon the Bed. The Surgeon keeps his *Apparatus* ready: His Injections must be warm, that he may dress the Wound as soon as possible, and not keep it too long exposed to the Air. During the Course of the Disease, gentle Purges and proper Glisters ought to be prescribed. The Patient must live upon good Broth, and Jelly, and in time upon Eggs; and his Food will be encreased by degrees, when the Danger is over.



C H A P. XXIX.

Of incysted Tumors, known by the Names of Wens, Glands, Scirrhus's, Cancers, and of those called by the Ancients Atheroma, Steatoma, and Meliceris.

IF I was willing to enlarge upon the different Opinions of Authors about the Nature of incysted Tumors, and should undertake to treat of those Diseases according to their Principles, I should perhaps be more prolix upon that Subject than they themselves are. I shall therefore confine my self to what I have learned of the illustrious Mr. *Petit*, both in the Cures which I have seen him perform, and in two Discourses delivered by him, one at the *Royal Academy of Sciences*, and the other in the Amphitheater of the Masters Surgeons of *Paris*.

WITHOUT minding the Order, that is commonly observed in the Explication of those Tumors, he follows a Method, whereby he is able to remove more effectually the Prejudices of the Vulgar.

ALL incysted Tumors, says he, begin with the Distention of a Gland, which assumes different Forms, according to its different Degrees of Growth, &c. Hence it is that some are fleshy, others from Defluxion, degenerate into Cancers; most of them have Bags, and some have none at all. Some of 'em suppurate; and the Pus contain'd in them is of a different Kind, whereby they are distinguished, as I shall shew by-and-by.

SINCE all Tumors proceed only at first from the Distention of one or many Glands, by reason of the nutritious Juice, and the *Lympha* thicken'd by their own ill Quality, or by the bad Disposition of the Gland it self; it is certain, that such a Thickening will obstruct the Vessels in the Inside of the Gland, and the Course of the Liquids contained in them.

THOSE Liquids being stopp'd and thickened in their Vessels, the latter will be dilated, and take up more Room; by which means the whole Gland must needs swell, and the Membrane that incloses it, will be farther removed, and consequently more distended.

THE Membrane of the Gland, being removed beyond its usual Bounds, and distended, will compress the Vessels, that run through its Substance to convey or bring back the *Lympha* or the Blood. But among all those Vessels, the Veins and Arteries will be less compressed than the lymphatick Vessels; because the Blood moves faster than the *Lympha*, and because the Blood-Vessels have an Elasticity, which the Lymphatick have not.

THE Lymphatick being therefore more compressed, the *Lympha* will be accumulated in the Circumference of the Gland; which will produce in it a Kind of *Oedema*. But the *Lympha* being at rest, and unable to continue its Course, by reason of the Compression in

the lymphatick Vessels, it will ouze thro' the Pores of their Membranes, and sufficiently moisten and relax the Membrane of the *Gland*, to facilitate the coming in of the arterial Blood and nutritive Juice, which not returning in the same Quantity, nor with the same Facility thro' the Veins and lymphatick Vessels, by reason of the Obstruction which we have supposed in the Inside of the *Gland*, those two Liquors will afford a new Matter to the Bulk of the *Gland*. Such is Mr. *Petit's* Opinion concerning the Growth of incysted Tumors, which will be quicker or slower, according as *Oedemas* are formed more or less frequently upon the Membrane of the Gland, which relaxing it more or less, will allow it to extend it self, and to yield to the continual Influx of the Juices, which thicken in the Gland by mixing with those that are already grown thick.

BUT if the Membrane of the Tumor happens at last to be so relaxed as to allow the Blood and *Lympha* to come easily into the Gland, those Liquors will come into it in great Quantity. But being stopped by the Obstruction, which has occasioned the glandulous Tumors, as I have just now explained it, they will gather in greater Quantity, and dilate their Vessels, from the Membrane of the Gland to the Place of Obstruction.

ALL those Vessels being dilated, 'tis plain the Tumor will very much increase, its Vessels will grow wider in Proportion, even the smallest of them, and by an excessive Extension and Dilatation, their Coats will grow so thin, that being no longer able to resist the new Influx of the Liquor, they will open, and let out the Liquid contained in them; which will make considerable Differences in the Tumor, according to the different Effusion that happens in it. If the Effusion proceeds

proceeds from the Rupture of a lymphatick Vessel, the *Lympha* coming out of the broken Vessel, will form an *Hydatides* or watery Tumor. If a Vein, through an excessive Dilatation, opens and occasions an Effusion of Blood, it will be a bloody Tumor, which we call varicous. On the contrary, if the arterial Blood be diffused, it will be an *aneurismal* Tumor.

IF the Blood-Vessels and the Lymphatick are broken in different Parts of the Tumor, those Effusions will be a considerable time without making any Alteration; but if the Blood and *Lympha* mix together, they will produce different Alterations in the Tumor, and quicker or slower, according as their Mixture is more or less equal. For if those two Liquors mix together in a proportioned Quantity, there will arise a Fermentation, which will very much increase the Tumor, and be attended with a Redness, and a considerable Heat.

IF the Tumor does very much increase, all the small nervous Fibers, which convey the animal Spirits into it, must needs be very much distended, and very susceptible of a Tremor; and being over-much agitated by the Fermentation in the Tumor, they will drive back the Spirits towards the Brain, and occasion a very great Pain.

IF a great Pain occasions a great Agitation in the Liquids, the Blood and Spirits will be in a violent Motion. And because a Fever supposes a violent Agitation in the Mass of Blood, the Tumor (such as we suppose it) will be attended with a Fever.

LASTLY, Part of the different Liquids, that are in the Tumor, cannot be in a Fermentation, but their Principles must be disunited, and change their Nature, which will produce *Pus*. But if the Liquors diffused in the Tumor are not in a proportioned Quantity,

tity, all those Accidents will appear but slowly. For Instance, if a great deal of Blood, and a small Quantity of *Lympha* be diffused, the Tumor will always be sanguin, the Fermentation will be slow, the *Pus* will not be formed till a long time after, and perhaps not at all, if there be no *Lympha*; which is plainly demonstrated by the *Varices* and *Aneurisms*. On the contrary, if the *Lympha* prevails over the Blood, the Tumor will always be serous: There are in it commonly some Clods of Blood; and there is one chiefly at the opening of the Vessels, which stops it, and prevents its Effusion: And because the *Lympha* is a Liquor, that has very little Motion, the Fermentation will still be slower than in the sanguin Tumors; as it plainly appears from *Dropsies* of all Kinds, which last a considerable time without producing *Pus*.

SINCE we are agreed that an exact Mixture of the two Liquors ferments after a certain manner, and forms *Pus*, we must also acknowledge, that an unequal Mixture of those Liquors will ferment differently, and that from those different Fermentations there will arise many Differences in the Nature of the *Pus*. Thus it appears, that in the same Tumor, there may be some Parts which have not wholly lost the glandulous Texture. Others will be callous, by reason of the different Degree of Fermentation, of the irregular Salts with which they are imbibed. In other Parts, there being no Effusion but of the *Lympha*, it will be serous. In others, the Blood being the only diffused Liquor, there will be Clods of Blood. Lastly, the Blood and the *Lympha* being mixed together in some Parts of the Tumor, there will arise *Pus*, which will be different, according to the Disposition of the Liquors, the Unequality of the Salts, and the different Degree of Fermentation. So that we find some-

sometimes in certain Parts of those Tumors as laudable *Pus*, as in the kindly Abscesses whose Matter is thick and curdled, and sometimes *Pus* like Tallow, thick Milk, or Honey; whereby the three Sorts of Tumors, called by Authors *Atheroma*, *Steatoma*, and *Meliceris*, have been distinguished.

Mr. *Petit* has extirpated some incysted Tumors, wherein he found all those different Matters, of which he has drawn Models in Wax, which he has shewed in publick.

I have enlarged upon the Membrane of the Gland, and sufficiently explained how it yields to the Distention of the Gland; so that one may very well believe that it forms the Bag of those Tumors. Now because that Membrane may have a closer Texture in one Place than in another; or because the *Lympha* relaxes it more in some Parts than in others; one may very well foresee that the Membrane will be able to resist the Distention of the Gland, in some Part of its Circumference, and that in others it will yield and easily stretch: Which is the Reason why those Tumors have very different Figures, some being flat, and others round; lastly, some are oblong, and others have all Sorts of irregular Figures.

SOME Tumors, though very hard, have no Bags; which seems to be a Paradox, after what I have said of Tumors and their Bags; but that Difficulty may be removed in the following Manner.

IF it be true, that all Tumors begin with a glandulous Tumor, it is no less true that all Glands have a Membrane, and consequently that all Tumors must have a Bag, or a Tegument. And if there are Tumors without, it is not because the Gland, which has occasion'd the Tumor, had no Membrane; but because the Membrane of that Gland burst in the
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very Beginning of its Dilatation; or, according to others, because the twisting of the small Vessels, which compose the Body of the Gland, distending it self, and increasing more and more, those Vessels are forced to remove on all Sides, and to revolve in Folds upon one another; by which Means, what was internal will become external, and by that Inversion the Membrane of the Gland will be contained in the Inside of the Tumor. This has been frequently confirmed by the Extirpation of those Sorts of Wens, in which nothing appeared next to the Skin but a fleshy Mass; and when they were dissected, they found in their Centre a membranous Body, more or less hard, and of different Figures, according to the different Growth of the Gland. Mr. *Petit* has seen some of these Tumors, wherein one Half of the Membrane was without, and the other Half within.

Secondly, Some Membranes, by much stretching as the Gland increases, grow so thin, that they wear out at last; which is the Reason why some Remains only of the Bag are to be seen, when the Tumor is extirpated.

Thirdly, The Bag may also disappear; because, by adhering to the adjacent Parts, it is confounded with them. Mr. *Petit* has seen some Tumors, the Bag whereof was adherent, and confounded with the Fat.

Fourthly, The Coats of some Tumors have been corroded by Putrefaction; and we cannot have a better Proof of it, than by recalling to mind certain glandulous Bodies, which after Distention, have been imposthumated; and when they were opened, no Sign of a Bag, or but a very small Part of it, was found in them.

BESIDES the Tumors, of which I have given an Account, we know by Experience, that there
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are two other Sorts. Some are nothing but a Dilatation of the lymphatick Vessels, or of the Veins and Arteries; and each of them has a proper Name, according to its Kind, as I have explain'd. The second Sort of those Tumors is derived from the fat Cells; and these are produced by the oily Humour of the Blood, detained in the Cells of the fat Membrane, commonly call'd the Fat. Mr. *Petit* has known a Tumor of that Kind in a Woman; It weigh'd 48 Pounds, and lay between both Shoulders.

THE Membranes of the Vessels in the first Sort of Tumors, and the fat Cells in the other, form the Bag, and therefore we have reason to set down three Sorts of Tumors, *viz.* the *glandulous*, the *vascular*, and the *vesicular*.

NOT to omit any thing, that contributes to the Formation, Growth, and sad Consequences of Cancers, and other incysted Tumors; I shall here set down my Thoughts concerning the shankery Humour.

AUTHORS are very much divided in their Explication of that Humour. Some ascribe it to a Defect in the Part, and the Reason they alledge for it is, that when a shankery Tumor happens to be extirpated in its Beginning, it is cured without any Relapse. Others say, the Blood is infected with that Humour; and to maintain their Opinion, they observe, that when a shankery Tumor has been extirpated, the Mass of the Blood quickly produces another in other Parts. Lastly, others being willing to reconcile these two Opinions, say that the shankery Tumors are occasioned by the Defect of the Part, and the Infection of the Blood.

As for me, I have already said, that all those Tumors have at first no other Cause but the Distention of one or many Glands; because the nutritious Juice,
and

and the *Lympha* are grown thick in it, either by their own ill Habit, or by the bad Disposition of the Gland it self. And Mr. *Petit* is fully persuaded that the Defect of the Part has the greatest Share in it, since he has cut off shankery Tumors, either opened or unopened, and even of all Kinds, from People affected with the King's Evil, the Scurvy, and the venereal Disease, and they were perfectly cured.

HOWEVER, I don't deny but the Blood contributes very much to those Tumors, as Mr. *Petit* believes; but it will not be infected by them before they have lasted long, and are come to such a Degree that the Surgeon has lost all Hopes; and then the Tumor having communicated a great many saline Particles to the Blood, it will be wholly impregnated with them: And yet it appears by several Instances, that when the Nature of the Blood has been, as it were, changed by a good Course of Diet, and with the Help of Physick, Surgery overcame the Distemper.

ALL Tumors in general may grow shankery by ill Usage, *viz.* by the Application of Remedies, that put the Salts of the Tumor into Motion, or coagulate the different Liquids contained in it, such as the Poultice of Crumbs of Bread, which, tho' anodyn, grows sour, ferments, and coagulates the Humors, unless it be newly made, frequently renewed, and diluted with new Milk, that does not curdle, and provided the Bread be unleavened.

'Tis true, there are some Tumors more shankery than others: They do not rise equally; and one may see in their Surface Prominencies of different Colours, and Vessels distended, varicous and bloated; the Whole being attended with violent Pains. Hence it is that some have been of Opinion, that the *Cancer* was an Animal, which corroded, and, as it were plucked
out

out the Pap, mistaking varicous and distended Vessels for the Feet of that Animal. Nay, their Folly went so far, as to lay upon those opened Tumors some Pieces of Flesh, to feed that pretended Animal; as if it were impossible to give truer and more plausible Reasons of all those Symptoms.

THERE are some Tumors very different from the latter, since they are formed, increase, and ulcerate without any Pain. Certainly these Tumors ought not to be looked upon as Cancers.

BEFORE I put an end to these Explications, I must resolve a great Question, *viz.* Whether incysted Tumors, such as *Wens*, *Schirrus's*, *Cancers*, &c. have Roots and Adherences; for it has been laid down as a Principle, that when the Roots reach very far, and the Tumor is adherent, it ought not to be meddled with.

'Tis a vulgar Error to be found among all those, who have writ upon this Subject, to suppose in Tumors, whether they be shankery or not, long and penetrating Roots, which prevent the Success of the Operation. 'Tis certain there are no Roots; and Mr. *Petit's* Experience, and Observations upon a great many Tumors, even of all Kinds, which he has cut off, has taught him, that what has been mistaken for Roots by those, who did not carefully examine the Matter, are nothing but conglobated Glands, that have been compressed by reason of the Distention of the large Tumor, which pressing their Vessels, forced the Liquors to stay longer in them.

'Tis also true, that one may sometimes perceive, by feeling all those Tumors, some Adherences, which seem to be very considerable; but they ought not to be looked upon as Roots adhering to the adjacent Parts. Mr. *Petit* absolutely denies the Existence of
Roots

Roots and Adherences ; and when a Tumor is not moveable, he explains it in the following manner, and shews in what Cases it happens to be so.

SOME Tumors lie in certain Places, wherein at the very Beginning of their Growth, they were moveable and fluctuating ; which happens to the Glands, that are distended under the Arm-pits. But when they have attained to a certain Degree of Bigness, they become unmoveable, not because they have contracted some Adherences with the adjacent Parts ; or because they have some Roots, which keep them in that Situation ; but because they take up the whole Cavity of the Arm-pit, and being compressed on all Sides, they cannot stir.

AGAIN, the Tumors to be found under *Aponeuroses*, or under large Muscles, such as the *Aponeurosis* of the *Fascia lata*, under the great Dorsal and pectoral Muscles, &c. I say, those Tumors are unmoveable, not by reason of any Adherence, but because being compressed by those Parts, they cannot stretch out according to all their Dimensions, and are consequently without Motion. Mr. *Petit* has cut off a Tumor of that Kind : It seem'd to be adherent, because it lay under the Muscle called, the *Serratus Anticus major*, the *latissimus dorsi*, and the *pectoralis* ; but in the Operation he perceived no Adherence : That Tumor weighed ten Pounds.

LASTLY, some Tumors are very flat, and of so great an Extent, that they cannot move. It would be wrong to say, they have Adherences.



C H A P. XXX.

*Of the Operation of the Cancer, and
incysted Tumors.*

SINCE we are now apprised of the Nature of incysted Tumors, and that they are all derived from a glandulous Tumor, or from the Dilatation of some Vessels, as I have explained it, that Knowledge must needs lead us to a quicker and safer Method of curing them.

ONE may try the Cure of incysted Tumors in their Beginning, by the Application of external Remedies; and if one may with the Help of those Remedies soften the Gland, resolve the thickened Juices, and open a free Passage to the Vessels, the Tumor will grow less by degrees, and wholly disappear.

THE Glands of the Breast, or of the other Parts, are sometimes distended by Blows, and would frequently degenerate into Cancers, if not timely prevented. I have had sometimes such Tumors under my Care, and I cur'd 'em by using the two first Days a Poultice of Crumbs of Bread, frequently repeated, to abate the Tention and Inflammation. And to resolve the thick Juices in the Gland, I laid every Day upon the Tumor a Plaister, taking care to purge the Patient frequently. Such is the Practice of the Surgeons of the *Hotel-Dieu*; and it succeeds very often.

WHEN the best external Remedies have not succeeded, the Surgeon must proceed to the Operation, which will be different, according to the different Tu-

mors. If the Tumor be lymphatick or watery, or if it be purulent, Mr. *Petit* advises to open it, in its whole Length, to evacuate the Matter contained in it, and to examin well the Bag, with which it is covered; for if it be not vitiated, the Surgeon must make it suppurate in its internal Surface; but if it be hard and callous, he must cut as much of it as he can, and consume the remaining Part with Causticks. Afterwards he must reunite the Wound as soon as possible. Mr *Petit* advises to cut off all the other Tumors above-mentioned, and even the sanguin, that is, the aneurismal Tumors, which partake of the Aneurisme and the simple *Varix*. But Causticks ought not to be used to perform these Operations; for besides their Slowness in working, they frequently make the Part worse than it was, and occasion a great Pain.

To remove those Tumors, the Surgeon must not open them lengthwise, for fear of opening some Blood-Vessels, which are dilated in the Substance of the Gland, and occasion a periodical Hemorrhage, of which the Patient dies the third, fourth, fifth, or sixth Day.

IN order to know the periodical Time of those Hemorrhagies, and the Difficulty of stopping them, the Surgeon must remember what I have said concerning the Growth of those Tumors, and the Compression of their Vessels, which preventing the Return of the Blood and *Lympha*, makes them stay in the Vessels of the Gland; which cannot happen but those Vessels must be dilated, and their Dilatation will be in Proportion to the Bigness of the Tumor. And therefore, if the Vessels within the Tumor be opened, they will afford a great deal of Blood; because they are very full of that Liquor; but the Arteries, which furnish them with Blood, being very small, will not
fill

fill them up before a certain Time; which will occasion a periodical Evacuation of Blood, that will be longer or shorter, according to the Proportion between the internal and external Vessels. On the contrary, if the Surgeon removes the Membrane of the Bag, and takes away that opened Tumor, together with its *Cystis*, as Mr. *Petit* has done, there will only appear some small Drops of Blood; hardly perceptible; because nothing remains but small capillary Vessels, which will soon cease to flow when the dilated Vessels of the Gland are taken off.

Mr. *Arnaud* explains that *Phænomenon* by a very plain Comparison. He says, those Tumors may be compared with the *Placenta* in the *Uterus*. If the *Placenta* be torn, or half destroyed, it emits a great deal of Blood periodically. But if the *Placenta* be carefully removed, all the large dilated Vessels are removed, (for every body knows, the *Placenta* is nothing but a Complication of dilated Vessels), and nothing remains in the internal Coat of the *Uterus* but small capillary Vessels, which emit some Drops of Blood, that are quickly stopped.

BEFORE the Surgeon proceeds to the Operation, it will not be improper to prepare the Patient for it with Phlebotomy, gentle Purges, Aperitives, Absorbents, and Emollients; and that Preparation ought to be longer or shorter, according to the Oldness of the Disease, and as it is more or less complicated with sad Accidents. Perhaps it will be said, that since I have proved by the Mechanism of those Tumors, and Mr. *Petit's* Experiments, that the Defect is rather local than universal, the Preparation is needless, and the Surgeon ought to proceed immediately to the specific Remedy. That's true in some Tumors, when Bleeding once or twice, and one gentle Purge are suf-

ficient to prevent an Inflammation, &c. But I have mentioned some Tumors very old, shankery, and ulcerated, very livid, and which are true Cancers; I have said, that in a long time they communicate so many saline Particles to the Blood, that it is more or less infected with them. In this Sort of Tumors long Preparations are necessary. Besides, Absorbents, Emollients, and Purges, ought to be used even during the Cure, and a long Time after the Recovery of the Patient.

SINCE I have shewed that all incysted Tumors have, properly speaking, neither Adherences, nor Roots, I shall depart from the Rule laid down by all Surgeons, who say that those Tumors, which are not moveable, and which have Adherences, as they pretend, ought to be let alone. And I shall follow Mr. *Petit*, who has shewed the Impossibility of the pretended Roots, and who believes all incysted Tumors may be extirpated, unless they come to such a Degree, that the Surgeon can have no Hopes of a Cure.

To proceed to the Operation, besides the Circumstances above-mentioned, I shall take Notice of two others, that are very material. 1. The Surgeon must cut only the Skin and the Fat, without touching the glandulous Body. 2. He must preserve as much of the Skin as he can, to facilitate a speedy Re-union.

THERE are three different Ways of making the Incision. The first is proper for a Tumor of a middling Size, and it ought to be longitudinal. Afterwards the Surgeon separates the Tumor from all the adjacent Parts; and then he brings the two Lips of the Wound near one another, to re-unite them as soon as possible.

ON the 1st of *April*, 1718, I saw Mr. *Petit* perform such an Operation upon a Woman of eighteen or
twenty

twenty Years of Age : She had a small Tumor in the lateral and upper Part of the Nose, near the great Angle of the Eye. The Tumor, when removed, looked like a polypous Fleish ; and the Wound was cured in six Days.

Secondly, If the Tumor was larger, in the Breasts for Instance, an Incision should be made all along the Breast, in order to facilitate the Removal of the Gland ; which would be cruel and painful : and therefore the Surgeon makes a longitudinal Incision upon the Tumor ; and from the Middle of that Incision, he begins an horizontal one ; which is called an Incision like a T.

Thirdly, If the Tumor was so considerable, that it could not be removed without a large Opening, as it happens in some fat Tumors of a prodigious Bigness, and wherein a very bad Humor is formed ; it being necessary to eradicate that whole Tumor with its Bag, a great Opening ought to be made in the Skin ; and therefore the Surgeon must make a crucial Incision, and then take off the Tumor from all the adjacent Parts, and bring the Angles of the Skin near one another, which may be reunited by Means of a Suture.

WHEN any of those Incisions are made upon the Breasts, the Nipple ought to be avoided, and preserved as much as possible ; but when the Incisions are made, the Patient must stretch out his Arm, to bend the Pectoral ; for its Surface being harder, the Gland may be separated without hurting the Muscle, and the Operation will be more easily performed.

IF the external Skin of the Tumor be impaired in some Place, either by Putrefaction, or otherwise, the Incisions ought to be directed in such a Manner, that the Surgeon saving as much of the Skin as he can, may take off the corrupted Part, together with the

Tumor. But if the whole Skin, that covers the Tumor, be vitiated, tho' it be in the Breasts, the whole distemper'd Pap must be cut off.

THERE are three different Ways of performing that Operation, *viz.* that of the Ancients, that of the Moderns, and that of our Operators. The Method of the Antients consists in passing through the Tumor two Strings which they fasten together, to make a Loop, with which they suspend the Tumor; and cutting round about with a Razor, the Blade whereof is fastened to the Handle with a Fillet or a Spring, they lop off the whole Pap at once. The Moderns have invented a *Forceps* with small Hooks, which they thrust into the glandulous Body, and raising the Tumor by that Means, they cut it off with a Razor, as the Antients did.

THOSE Methods are too cruel and painful, and too imperfect. I shall therefore reject them; first, because when the Surgeon pierces the Tumor with a Needle, to pass the Strings into it, or when he thrusts the Branches of the *Forceps* to raise it, he puts the Patient to great Pain. Secondly, 'tis impossible for the Operator, when he cuts the Tumor in that Manner, to do it so exactly as not to hurt very much the pectoral Muscle on which it lies, or not to leave one Half of the Gland.

THE best Surgeons now take the Tumor with the left-Hand, and raise it a little, for two material Reasons. First, to perceive the Vacuity between the Tumor and the pectoral Muscle. Secondly, to brace the Skin tight, in order to cut it more easily.

THE Tumor being thus raised, the Surgeons have a fixed Place to begin the Incision: They call it the Place of Choice, and have fixed it in the upper Part of the Tumor; because the Blood is not so troublesome

some during the Operation. But this Rule ought not to be strictly observed; nay, in some Occasions it would make the Operation more difficult. I should therefore willingly begin the Operation in that Part of the Circumference of the Tumor, which gives the greatest Hold to the Operator.

A Razor fastened to its Handle with a Fillet or Spring, is commonly used for that Incision; but because the Skin and the Fat are the only things to be cut, we shall use, as Mr. *Petit* does, a *Bistouri* somewhat crooked, and pierce the Skin perpendicularly, and not slanting. With such a Caution, the Surgeon does not lay bare the nervous *Papillæ*; and he avoids great Accidents, which are frequently attended with Death.

THE Surgeon having cut about 3 or 4 Inches of the Skin and Fat, separates the Tumor, and then cuts the Skin and Fat on both Sides of the Tumor, to make an end of the Operation. There is no need of cutting the Skin circularly: Nay, it is a Fault to do so; for if the Surgeon desires a quicker Re-union, he must make a longitudinal Incision, that he may the more easily bring the Edges of the Skin together, to make a Suture, as Mr. *Petit* did in an ulcerated Cancer, which no body would undertake to cure; and yet the Woman, troubled with it, was cured in a very short time.

IF that Operation be performed in a Place where the Skin does not yield much, and the Loss of the Substance be so considerable, that the Lips of the Wound cannot be brought together to make a Suture; Mr. *Petit* uses the Plaister of *Andreas à Cruce*, and says, that if a Surgeon cannot do as much good as he wishes, he must do as much good as he can.

It appears from our Method of curing all incysted Tumors, that I very much dissent from those, who,

to purify the Mass of Blood, and consequently to prevent a Relapse, keep up a long Suppuration, to evacuate the bad Serosities, with which the Flesh and the Fat are infiltrated. Nay, Mr. *Petit* says, he wishes he could reunite the Wound in four and twenty Hours, and maintains that a Relapse in those Diseases proceeds only from a long Suppuration; Part of the *Pus* being convey'd into the Mass of Blood, whilst the other comes out at all the Dressings, which are too frequent. And indeed I have seen some Surgeons dress those Wounds regularly twice a-day; and at every Dressing they carefully wiped the smallest Parts of the Wound, as if a kind of Glue or Varnish, which continually runs from divided Fibers, could have done it any Harm. Besides, they spent a great deal of Time in pulling small Membranes half putrified, as if they would not have come off of themselves afterwards. Besides, during a long Dressing, the Wound remains exposed to the Injuries of the Air, which is often very bad.

SUCH Dressings occasion afterwards *Phlegosés* at the Extremity of the divided Fibers, which distending the whole Wound, and particularly its Circumference, dry it up, and prove the Cause of a Reflux of Matter, attended with several Accidents. In some Tumors, the Blood being thus infected with the Salts of the Wound, discharge those Salts from some Glands into others, distended them, and by that Means occasion a Disease. The same Salts, in other Tumors, fermenting violently in the Mass of Blood, occasion a *Delirium*, a Leanness of the whole Body, and Death.

SURGEONS do not ascribe those sad Symptoms to their ill way of dressing; but fond of their Practice, they draw Consequences, which appear to them very plausible. First, they make People believe that those

Diseases

Diseases lie in the Blood, and consequently are liable to a Relapse. Secondly, if the Patient dies, they say, that the Part upon which the Blood was wont to empty it self of its Salts being removed, those same Salts must needs cause a violent Fermentation, &c. Thus they conclude that a Surgeon must not undertake to cure incysted Tumors, that are ulcerated and flankingery; and looking upon them as incurable, they give over the Patients.

If the Extirpation of incysted Tumors, or their Amputation, are frequently attended with bad Success, 'tis because the Operators have not a sufficient Knowledge of their Subject; for there are some Cases, which require great Skill in Anatomy. A Surgeon ought to know the Direction of the fleshy Fibers of the Muscles, and the very Place where their Ligaments are fastened. That Knowledge is not sufficient: The Operator must also be able to distinguish those that end with Tendons, and those that end with *Aponuroses*, that he may give a right Prognostick, be very wary in his Incisions, and avoid all Dangers. The Tumors, which Mr. *Petit* has extirpated under the great pectoral dorsal Muscles, &c. are convincing Proofs of what I say.

I shall conclude this Subject with the following Observation. Mr. *Arnaud* extirpated a Wen as big as a Child's Head, in the fore-part of the Knee. The Skin, that covered it, appeared very livid and inflamed. That Tumor had a Hole in it, that let out a great deal of Blood at several times. Mr. *Arnaud* being afraid that some considerable Vessel was opened, put a *Turniquet* in the internal Part of the Thigh, to make use of it upon occasion. The Extirpation being made, nothing was seen in the Tumor but a vast Number of capillary

pillary Vessels, which emitted small Drops of Blood. That Surgeon had the Curiosity to know what happened in the Tumor, and from whence proceeded those Periodical Evacuations, which were so considerable. He found a great Number of very large and dilated Vessels; which gave him occasion to compare the periodical Flux of those Tumors with the *Placenta*, when half of it has remained in the Womb, as I explained it above.

It frequently falls out, that the Surgeon opens small Arteries, when he performs those Operations. They must immediately be tied, or compressed.

IF I depart from the usual Method in the Operations relating to incysted Tumors, I depart also from the usual Method of dressing them after the Extirpation; for if the Surgeon has only cut off a small Gland lying under the Skin, he must only bring the Lips of the Wound near one another, bid a Servant hold them, cover the Interstice between them with a dry and thick Compress, and lay over it some other Compresses, and a Bandage proper for the Part. That Dressing is left two or three days untouch'd, &c.

IF the Wound be in a Place, where the unitive Bandage may be properly used, the Lips of the Wound must be kept together by that Bandage: It must be applied bare upon the Part, or at most with two small Compresses on the Sides of the Wound, and at some Distance one from another, for the Reasons above mentioned, when I discoursed of Sutures.

IF the Wound is more considerable, and the Suture has been used to re-unite the Lips, the Surgeon must apply bare Lint, I mean, without any Shape of Plagets or Dozels, all along the Wound, and above the Skin in the Circumference. This Method has a
wonderful

wonderful Success: It brings perfectly well the Fat and the Skin near the pectoral Muscle, if it be, for Instance, in the Breasts. The Surgeon covers the Lint with three or four Compresses dipt in warm Brandy, and supports the whole with a Napkin doubled three-fold, according to its Length, and the Scapulary, as I have said, discoursing of the *Empyema*.

IF the Skin has been cut off with the Tumor, and the Lips of the Wound cannot be perfectly re-united; it must be covered with Plagets of dry Lint, without using astringent Powders, (as is commonly done,) which dry up the Part, and retard the Suppuration. Afterwards, the Compresses and the Bandage must be laid, as I have already said.

THE Patient ought to observe a very strict Diet the first Days: Phlebotomy, Purges, and all other proper Remedies are to be prescribed, as Occasion requires.

C H A P. XXXI.

Of the Squincy, in relation to the Bronchotomy.

THE Squincy is a great Difficulty of breathing and swallowing, occasioned most times by the Distention and Inflammation of the Glands lying near the *Larynx*, the *Pharynx*, and the Muscles subservient to those Organs.

THE Causes of the Distention and Inflammation of the Glands of the Throat, and of the Muscles which dilate and straiten the *Larynx* and the *Pharynx*, are either internal or external. The internal Causes

Causes of the Distention of the Glands of the Neck, are an Obstruction of those Glands, occasioned by the Thickness of the Humor filtrated by them, which being too gross, cannot easily pass through their excretory Tubes; so that accumulating by degrees in those Glands, it distends them, and stops the Blood in their Circumference; by which Means the *Larynx* and *Pharynx* are pressed, and inflamed.

THAT Humor will grow thick, either in the Blood, or in the Glands. If I should explain how the Humor filtrated in the Glands of the Neck grows thick in the Blood, it would be an endless Thing, since I should be obliged to give an Account of all the Constitutions of the Blood, which may occasion that Disease; and I should digress too much from the essential Part of this Treatise, which concerns only the Practice of Surgery.

THE external Causes of the Squincy are sometimes a Consequence of a moist or rainy Air, as *Hippocrates* observes in his XVI. Aphorism, *Section 3.* or when a Man breaths a cold Air for a long Time, as it happens sometimes to those, who cry out, and speak very much, and with Vehemency. Cold Liquors drunk by People, that are not used to them, may also occasion the Squincy. Lastly, acrimonious and acid Aliments, and extraneous Bodies swallowed by chance, which by an Irritation in the Glands, or Muscles of that Part, occasion an Inflammation, are the Cause of that Disease.

THE diagnostick Signs of the Squincy ought to be considered in its Beginning, and when it is a confirmed Squincy: Those Signs that denote a growing Squincy, are a Difficulty of breathing and swallowing, a considerable Pain and Heat in the Throat, a Distention and Redness of the *Uvula* and *Tonsils*,
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the Thickness of the Spittle, the Head-ach, and a painful Stifness of the Neck.

ON the contrary, those Signs that discover a confirmed Squincy, are more violent. The Difficulty of breathing and swallowing is much greater, since the Patients generally cast up all the Liquors thro' the Nose. The Bottom of the Throat is full of Spittle: The Respiration is almost suppressed: The Nostrils are very much dilated: The Patients can neither spit, nor lie down, without running the Risk of being stifled: The Face is red and inflamed: The Eyes sparkle; and all those Accidents are generally attended with an acute Fever.

THE Prognostick of that Disease is more or less dangerous, according to the Difficulty of breathing and swallowing; for since Life is only preserved by the Air we breath, and by Food, it follows that the more difficult the Respiration and Deglutition are, the more dangerous the Disease will be.

IF the Difficulty of breathing is almost over, and the Out-side of the Neck appears neither distended, nor inflamed, 'tis a Sign, the Disease lies in the Muscles of the *Larynx*: It is then very dangerous, and the Patients generally die in a little time.

IF the Disease be attended with a considerable Fever, as it frequently happens, the Arteries will convey a great deal of Blood into the Lungs: And because they do not receive all the Air they want, by reason of the Inflammation lying in the upper Part of the *Aspera Arteria*; that Blood in the Lungs not being attenuated by the Air, will stay in it, and occasion an Inflammation, and all the other Accidents that may attend it. From whence it appears that a Squincy with a Fever is much more dangerous than a Squincy without a Fever.

IF the Patient cannot breathe but when he sits, 'tis a Sign the Inflammation has reached the Lungs; whereby the Disease becomes more complicated, and consequently more dangerous.

IF the Patients can hardly breathe, whatever Situation they be in, and foam in the Mouth, 'tis a Sign the *Aspera Arteria* is very much compressed, and full of Serosity; which denotes a Blood very much entangled in those Vessels which go to and return from the Brain, and in the Lungs. The Patients are then in a sad Condition, and die in a little time.

THE great Dilatation of the Nostrils is a Sign the Air strives with great Violence to get into the Breast, and that the Patient strives also to inspire, which can only proceed from the straitening of the *Aspera Arteria*, and the Obstruction of the Lungs; and consequently the Patient is in very great Danger.

LASTLY, if the Patients are sleepy, they seldom recover; for that Accident happens only when Respiration is very much obstructed, and the Compression of the *Carotides* and internal jugular Veins is so considerable, that the Blood has hardly any Motion in those Vessels; so that the Serosity being separated from them as well as from the Vessels of the Brain, it happens that the Brain is overflowed with it, which produces a Sleepiness.

THE Brain sinking, as it were, under the Weight of the Waters, and consequently the Spirits being separated from the Blood in a small Quantity, it follows that the Blood will no longer be put into Motion by the same, and will grow thick especially in those Vessels, where it has lost all its Motion. So that the jugular Veins being very much compressed, and the Blood contained in them not being able to go down lower than the Disease, the Serosity will be forced

forced to separate from it, and the Blood being dry will grow hard.

THE Heart conveying new Blood into the *Carotides*, and those Vessels not being able to discharge it, because the jugular Veins, which should receive it, are stopped, it will be forced to stay in the *Carotides*, its Serosity will separate from it, and it will grow hard as well as that of the internal jugular Veins: In which Case, Death is unavoidable. This reasoning is the more certain, because it is confirmed by the following Experience.

MR. *Arnaud* performed once the Operation of the *Branchotomy*: The Patient lived seven or eight Days. He opened his Body, and found the Blood of the internal jugular Veins, and the *Carotides* as hard as Wax.

IN order to cure that Disease, the Surgeon must quickly remove the Distention and Inflammation in the Throat; and if the Squincy is only beginning, or the Inflammation reaches more to the external Parts of the Neck, Phlebotomy repeated three or four times, Clysters, gentle Purges, and some good Topicks, such as emollient Poultices, Gargarisms, &c. will be sufficient to cure the Patient. The Surgeon may also make Embrocations round the Throat, with warm quieting Balsams, and then apply a Poultice upon it. One may even make the Patient take some of it inwardly; and it frequently appears by Experience, that the Use of it ought not to be neglected. But if the Squincy is confirmed, if the Distention and Inflammation are rather within than without, if Respiration is very much obstructed, and the Patient can swallow nothing, those Topicks ought to be omitted; for they perplex the Surgeon, and make him lose Time. On the contrary, he must bleed the Patient frequently and plentifully, as we shall see in the
next

next Chapter ; and if Phlebotomy proves ineffectual, he must proceed to the Operation of the *Bronchotomy*.



C H A P. XXXII.

Of the Operation of the Bronchotomy.

TO perform that Operation, the Patient must sit upon a Chair, or upon his Bed, and lean upon the Back of the Chair, or the Breast of a Servant, who holds his Head with both Hands.

AFTERWARDS, the Surgeon pinches the Skin transversely in that Place where he designs to open the *Aspera Arteria*, which lies about one Inch under the thyroid Cartilage, and according to the modern Operations between the third and fourth Ring under the Cricoid. The Operator bids a Servant do the same on the other Side of the *Aspera Arteria*, and raising the Skin jointly with him, takes a strait *Bistouri* in his Hand, and laying his fore-Finger upon the Back of that Instrument, he cuts the Skin about three or four Inches in Length, in the fore-Part of the Neck, the upper Angle of the Incision answering the *Symphisis* of the Chin, and the lower corresponding with the Middle of the Notch of the first Bone of the *Sternum*.

AFTERWARDS, the Surgeon separates with the same *Bistouri* the bronchial Muscles, and cuts the thyroid Glands in the middle, to lay bare the *Aspera Arteria*, in order to make a transverse Opening with the Point of a Lancet, between the third and fourth Ring, as I have already said.

It is impossible to divide the thyroid Glands into two, as is prescribed in this Operation, without cutting

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ting a vast Number of small twisted Blood-Vessels, which compose the Gland. Those Vessels being cut emit Blood, which falls into the Cavity of the *Aspera Arteria*; which is perhaps the Reason why that Operation does frequently prove ineffectual.

WITHOUT so many Precautions, which are more prejudicial than useful, Mr. *Petit* advises the Surgeon to touch the Space between the third and fourth Ring with the fore-Finger of his left-Hand, and to make in that Place a Mark with his Nail, without removing it. Afterwards the Operator takes with the right-Hand a Lancet, whose Blade is fastened to the Handle with a Fillet, and with the Help of the Nail conveys it into the Vacuity of the *Aspera Arteria*. As soon as he perceives he is in the Cavity, he gently conveys the Lancet upon the Sides, to enlarge the Opening.

THIS is the more easy, because Mr. *Arnaud*, who approves also that Method, says, that in this Case the Air is so much agitated in the *Aspera Arteria*, that the Surgeon hears a considerable Noise. Nay, he affirms that the *Aspera Arteria* is very much distended, and that the Surgeon easily perceives when he is in the Cavity; because he feels no longer any Resistance at the Point of the Lancet, and the Air comes out immediately with a great Noise.

AFTERWARDS the Surgeon withdraws the Finger of his left-Hand, to take a Stilet armed with a small flat *Cannula*, at the two Sides of which are small Loops, to pass two small Fillets. He introduces the Stilet, armed with a *Cannula*, into the *Aspera Arteria*, conveying it with the Help of the Lancet. He withdraws the Lancet, and introduces the small *Cannula*, with which the Stilet is armed, into the Orifice of the *Aspera Arteria*, and ties it behind the

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Neck,

Neck with the two small Fillets just now mentioned, and then he withdraws the Stilet.

THE Surgeon, in this Operation, must avoid touching the hinder Part of the *Aspera Arteria* with his Instruments; for it would occasion a Cough, which would be very troublesome to the Patient, and prevent the finishing the Operation.

To dress the Patient, some advise to put into the *Cannula* a little Cotton tied to a Thread, to qualify the Air, that gets into the *Aspera Arteria*. Others say, the Cotton frays, and may fall into the *Aspera Arteria*; or, that it stops it too closely; and therefore they use a very light Plaget of Lint, which they apply upon the Opening of the *Cannula*. Lastly, others maintain, that the Lint-Plaget prevents the Passage of the Air, and consequently that the Operation is useless; which is the Reason why they put nothing at all.

As for me, I would leave the *Cannula* open for a Moment, taking care before to keep the Windows of the Room shut, and to purify the Air with Fire. Afterwards, I would cover the *Cannula* only with a Piece of Linnen of a very loose Texture, that the Air might come in and get out through it. I would cover that Piece of Linnen with a Plaister made with Holes, and cover'd with a Compress of the same Figure, the Whole being supported by some Folds of a List, without passing over the *Cannula*, which should be only cover'd with the Piece of Linnen.

THAT Dressing is kept on, 'till the Air resumes its Course the usual Way; which generally happens before the third Day: And in order to know whether the Operation has had a good Effect, some advise the Surgeon to lay now and then his Finger upon the *Cannula*, and to stop it, that he may know whether
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the Patient breathes ; and when the Respiration is free enough, he removes the *Cannula*, and endeavours to reunite the small transverse Opening, that was made in the *Aspera Arteria* and the Teguments ; which may easily be effected by laying upon the Outside of the Wound some Drops of the *Commandeur's* Balsam, without putting any Dressing over it. Afterwards, the Patient must not be allowed to speak, or to swallow any thing for four or five Hours ; and then the Balsam will grow hard, and form upon the Wound a small Crust, by which it will quickly be reunited.

THAT Operation is very dangerous. Few Authors say, they have performed it, and fewer still, that it proved successful. The Reason of it seems to be, because they perform it too late, and when the Patient is dangerously sick ; for I am going to shew by some Instances, that the Wounds of the *Aspera Arteria* are not mortal.

Mr. *Arnaud* had under his Cure two Patients, whose *Aspera Arteria* was open. The Wound of the first Patient was occasioned by a Thrust with a Knife ; and he was perfectly cured by the Care of that Surgeon. The other Patient had been shot with a Pistol : The Opening of the *Aspera Arteria* was not parallel with the Wound of the Skin and Flesh ; so that the Air, which continually came out of the *Aspera Arteria*, both in the Inspiration and Expiration, meeting with an Obstacle on the Side of the Skin, got into the fat Cells, and occasioned, in the three or four first Days of the Dressing, an universal *Emphysema*, as if he had been blown all over the Body ; but his Head especially was monstrous. Mr. *Arnaud* being sent for, dilated the Wound, and discovered the *Aspera Arteria* : He applied upon its Orifice a Piece of chewed Paper, and

dress'd the remaining Part of the Wound as usually. The Patient's Swelling went off by degrees, and he perfectly recovered.

Fabricius ab Aquapendente tells us in his Operations, that *Albucasis* says, in the second Book, and 43d Chapter, that the Wounds of the *Aspera Arteria* are not mortal, and that he cured a Servant-Maid, who had cut it with a Knife.

Mr. *Dionis* says, he had under his Cure at St. *Germain's* a Man, who had been shot with a Pistol, at the hunting of a wild Boar. The Ball went in thro' the right-Side of the Neck, and came out thro' the left, piercing the *Aspera Arteria*; and yet he cured him very well.

LASTLY, here follows another Observation to be found in Mr. *Verduc's* Remarks. "It is well known, says he, that the late Mr. *Binard*, Master-Surgeon, performed that Operation on a Baker, who being come to *Paris*, in order to sell his Bread, was affected with such a violent Squincy, that every Body thought he could not live till the next Day; and yet by that Operation he was able to go Home four and twenty Hours after."

ALL those Instances seem to favour the Operation of the *Bronchotomy*, and to prove that it is not so dangerous as is commonly thought; but it ought to be performed, before the Patient has lost all his Strength; and all other Remedies must be tryed before the Operation. Those Remedies must not be mere Cataplasms, that are used by timorous Surgeons, who are afraid of Blood; for whilst they expect a good Success from them, which never happens, when the Disease is come to the Degree I suppose, the Blood grows so warm, and destitute of Serosity, that it hardens, according to Mr. *Arnaud's* Observation above-

bove-mentioned; and in such a Case, Death is unavoidable.

THE best Remedies to dissipate the Inflammation, and to facilitate the Circulation of the Blood in the internal jugular Veins, the *Carotides*, &c. is a frequent Phlebotomy in the Arms, the jugular Vein, and the Feet, as will appear by the following Instance.

Mr. *Petit* was sent for at nine of the Clock in the Evening to see a young Man, affected with a Squin-cy attended with the worst Symptoms. He blooded him plentifully, and did so again half an Hour after; and perceiving no Abatement in the Disease, he continued to blood him all Night in the Arms, and in the Feet and Throat. The Patient being still in the same Condition, tho' he had been let Blood thirteen Times, Mr. *Petit* desired a Consultation, to clear himself from the Reproaches of the Patient's Friends. Two Physicians were sent for, who instead of blaming him, order'd the Patient to be blooded three Times more till nine-a-Clock. After the last Phlebotomy, the Passage of the *Aspera Arteria* seem'd to be freer, he began to breathe a little, and having swallow'd some Spoonfuls of Water of Cassia, he was perfectly cured, abating his Weakness.

IF after twelve Hours, Phlebotomy sixteen Times repeated had not open'd a small Passage for a gentle Purge, the Surgeon would have proceeded to the *Bronchotomy*, which is always dangerous in that Sort of Diseases; because the Inflammation of the *Aspera Arteria*, and of all the adjacent Parts depending upon it, is very considerable; and because the Passage of the Air is stopped; which does not happen in the Wounds of that Part.

IT being usual in that Disease to blood the Patient very much, whether the Surgeon resolves upon the Operation or not ; it follows that he must needs be very weak ; and without over-charging his Stomach, he must take such Aliments, as will keep him up, and revive his thick Blood. This will be effected by very nourishing Broths, Jellies, and Cock-Broth, which is excellent for those sick Persons, that are very weak : It nourishes them very much, keeps them up, and revives thick and slow Blood.

THEY commonly take about seven or eight Drops, or more, in half a Glass of a pectoral Diet-Drink, or in four or five Spoonfuls of their Broth, or they take it alone.

GENTLE Purges, Clysters, and other proper Remedies, ought not to be neglected.

CHAP. XXXIII.

Of the HARE-LIP.

THE Hare-Lip is a Solution of Continuity, which happens in the Lips, either through a Defect in the original Conformation, or from some Accident, such as a Blow, a Fall, &c.

THAT Solution of Continuity has been called a Hare-Lip ; because it makes the Lip like that of Hares, which have the upper-Lip slit. The Operation of the Hare-Lip consists therefore in a Re-union of that Solution of Continuity, with the Help of the twisted Suture, as Occasion requires.

ACCORDING to the Definition of that Disease, there are two Sorts of Hare-Lip ; the one born with one, as I have said ; and the other, occasion'd by some Wound.

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AGAIN, the latter is divided into two Kinds, a recent, and an old one. The recent Hare-Lip is so called, when the Division of the Lip is still bloody. It requires only a Re-union by Means of the Suture, which must be twisted, if there is any Loss of Substance, to keep the Lips of the Wound near one another with the Help of Needles. But if there is only a mere Division, the intersected Suture exactly made in the Middle of the Thickness of the Lip, will be sufficient to procure a Re-union. I know it by two Experiences. A young Lady of thirteen or fourteen Years of Age fell down Stairs, and cut her upper-Lip all along the incisive Tooth next the canine, as far as the Side of the Nose, on the right-Side. Immediately, I made two Stiches of the intersected Suture, one almost upon the Edge of the Lip, to make the Re-union better, and the other in the Middle of the Division. I applied upon that Wound a Plaget cover'd with the Balsam of *Peru*, and above it a Compress dipt in Wine, and the compounded Bandage, called the Sling, to support the Dressing. I put between the Gum and the wounded Lip a small Piece of Linnen dipt in *Mel rosatum*, and blooded the Patient an Hour after. I forbid her to speak, and order'd her to take nothing but Broth in an open and flat Spoon. The next Day, I moisten'd the Dressing with warm Wine, and put again a Piece of Linnen dipt in *Mel rosatum* between the Gum and the Lip; and the third Day I dress'd the Wound in the same manner. Lastly, on the sixth Day, after I had dress'd it once in two Days, I took off the Stitches; because the Wound was perfectly re-united.

HERE follows my second Experiment. A Man of 26 Years, or thereabouts, fought with one of his Friends, who threw him down, and wounded him in

two Places with a Stone he held in his Hand. The first Wound was in the upper-Lip on the left-Side : It was transverse ; and one might see through its Opening the Eye-Tooth, and part of the Incisive. The Lip was bruised, and very much swell'd in the In-side ; and therefore it reach'd about an Inch beyond the lower-Lip. The second Wound was about two Inches long, and lay upon the middle-Part of the *Rectus Parietalis*, without laying the Bone bare.

I made a Sticth in the Wound of the Lip, beginning from the lower-Part of it ; because it was transverse, to bring it near the Nose, and to make it tight. I thrust the Needle, which was a crooked one, (as it ought to be in all those Sutures) into the Middle of the Thickness of the Lip, and dressed the Patient with a Plaget cover'd with *Arcæus's* Balsam, to excite a gentle Suppuration ; because there was a Contusion.

I made also a Stitch in the Middle of the Wound of the Head, taking Care to pierce only the hairy Skin, for fear of offending the *Aponeuroses* of the frontal Muscles, as I have said, speaking of Sutures. Five Hours after, I blooded the Patient in the Arm, and found the Lip so much lessened, that I was obliged to straiten the Stitch a little. The two following Days, a Surgeon, who was his Friend, dressed him only with Brandy, and the fourth Day I found the whole so well re-united, that I cut the Sutures, and never touched it since.

To resume the Thread of my Discourse, I shall say that the old Hare-lip is so called, when the Surgeon has neglected to reunite the Lips of the Wound, which afterwards have been cicatrized pretty far from one another, and cannot be brought together, without cutting the hard and callous Scar, to open by that Means the small Canals, which will inosculate with
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one another by means of the Suture, as I am going to shew.

BUT before the Surgeon undertakes that Operation, he must know that some Obstacles may render it ineffectual. Some Children, for instance, are born with that Disease. At that Age, they cry continually, and are only quieted by the Nurses Breasts; whereby the Lip is always in Motion, and consequently cannot be re-united.

BESIDES, Children at that Age have their Lips so thin, and the Texture of their Skin so nice, that they cannot bear the Needles, which are absolutely necessary, upon any Loss of Substance. Wherefore the Operation ought to be put off, 'till they be four or five Years of Age; for at that Time not only the Skin is of a firmer Consistence, but also flattering Promises, or the Fear of being always deformed, make them suffer more patiently what is to be done for the happy Success of that Operation.

IF the old Hare-lip was attended with a Rottenness in the Jaw; if there was any venereal, scrophulous, or scorbutick Ulcer; if the Patient was very lean, and his Blood acrimonious, salt, and serous; the Surgeon must not attempt the Operation, before he has destroyed all those Complications, *viz.* the Rottenness by Remedies proper for that Disease; the Ulcers just now mentioned, by mercurial Frictions, Antiscorbuticks, or by those Remedies, that are proper to cure the King's Evil. Lastly, lean People, whose Blood is acrimonious, salt and serous, by Remedies proper to soften it, to absorb its Salts, and to restore its former Consistence; which may be effected by the Advice of a learned Physician.

MODERN Books forbid us also to perform that Operation, when the Loss of Substance is so great,
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that the divided Parts cannot be re-united. I never saw a more reasonable Prohibition; for how can any one perform what is impossible?

OTHERS tell us that if the Operation was performed, when there is a considerable Loss of Substance, the Cure would be more pernicious than the Disease, because the Skin would be so distended, &c. that several Words could not be articulated.

IN this Case, the Loss of Substance must needs be very great; for every body knows, the Lips are very soft Parts, that yield very much, and consequently that the Operation may be performed, notwithstanding the Loss of Substance. Besides, not to say that *Fabricius ab aquapendente* advisest he Operation, Mr. *Arnaud*, Mr. *Petit*, and Mr. *le Dran* have performed it with very good Success, as I shall shew hereafter.

WHEN the Surgeon is resolv'd to perform the Operation, it is not improper to prepare the Patient, ten or twelve Days before, by Phlebotomy, gentle Purges, and a moistening Diet, in order to make his Blood of a good Consistence, sweet and balsamick, and consequently the nutritious Juice, by which the divided Parts are to be re-united, well qualified for producing these good Effects.

To perform that Operation, the Patient must be conveniently placed upon a Chair, or a Bed. And because we suppose the Circumference of the Wound to be cicatrized, we must cut that Scar, which stops the small Canals, that convey the true uniting Balsam; and therefore we shall use two small Pinchers called *Morailles*: They have an Elbow in the Middle, and a small Ring, which reaching to the Elbow may straiten them very closely.

THE Surgeon takes with one of those Pincers one of the Lips of the Division. He adapts that Pincer in such a Manner, that the Scar of the Lip may not reach beyond the Pincer above half a Line, or a Line at most, or above what he designs to cut ; and then he straitens the Pincer with the Ring, to keep the Lip from stirring.

THE Surgeon must do the same, with respect to the other Lip, and the other Pincer. Afterwards, he raises them both towards the Nose, that he may perceive, and brace a Ligament, which fastens the Lip to the Gum. He cuts it to perform the Operation more easily ; but he must take Care not to affect the Gum, for fear of laying bare the Jaw-bone, which would always remain bare, according to the Opinion of many Authors. The Surgeon must also avoid, as much as he can, to cut upon the Lip, though the Accident would not prove so bad.

IN order to prevent those two Inconveniencies, I shall follow the Direction of Mr. *Arnaud*, that able Practitioner. He cuts that Ligament or Bridle with Scissars pointed at both Ends. That Instrument cuts equally both Sides of the Ligament, and by its means the Gum, or the Lip, may be better preserved, than with the *Bistouri* recommended by Authors.

THAT small String being destroyed, the Surgeon must with the same Scissars cut about half a Line of the upper Angle of the Division, to destroy all the Callosity, which would otherwise leave a small Hole in the upper Part of the Hare-lip.

AT the same time, if the Scissars cut well, the Surgeon shall cut the Scar, which reaches beyond the Pincer, taking the Pincer with his left Hand, and the Scissars with his right ; I say, he is to cut the whole Callosity at once, and evenly, taking care not to cut

too much of it, but as much as is necessary to open the small Tubes, which are to inosculate with those of the opposite Side. Afterwards, the Surgeon will take the other Pincer with his right Hand, and cut the opposite Scar in the same Manner, taking care that the two Strokes of the Scissars may end towards the first Division we at first made in the upper Part of the Wound, and end in a very acute Angle.

WHEN the Surgeon has cut all the Callosities, that might prevent the Re-union of the Hare-lip, he must loosen the Rings of the Pincers, and remove them from the Lips, which they hold. The Operator need not be concerned at the Blood, that comes out: It stops easily; besides, 'tis not improper to let the Wound bleed a little, in order to clear the Tubes.

AFTERWARDS, the Surgeon must think of re-uniting that Division. To that End, Surgery affords us the twisted Suture, so called, because the Thread is twisted about two or three Needles.

THOSE Needles being very small, and the right Hand not being able to drive them safely, nor the left to support the Part, the Surgeon must have recourse to some Helps proper for both Hands. Let him use for the right Hand an Instrument, into the Groove of which he shall put the Head of the Needle; but he must first of all wrap about it a small Piece of Linnen, or Paper; for in whatever Manner the Instrument be grooved, it cannot hold the Needle fast enough. When the Surgeon has surrounded the Head of the Needle with a small Piece of Linnen or Paper, and put into it the Groove of the Instrument, which is therefore called a Port-needle; he straitens the Instrument with a small Ring, &c.

THE other Help proper for the left Hand is a small *Cannula*, generally made of Silver, flat on that Side where

where it is applied upon the Parts, to be tighter, and split in the opposite Part to let in the Thread. I shall describe those Instruments at the End of this Treatise.

THE Surgeon, being provided with those Instruments, shall make the two Lips of the Wound level one with another, and bid a Servant hold them in that Situation, who shall press the Cheeks of the Patient, as much as is necessary to keep the Division perfectly even, and in such a Manner, as not to disturb the Operator in his Operation.

AFTERWARDS, the Surgeon shall lay the Ring of the *Cannula* in the lower Part of the Hare-lip, at two Lines distance from the Opening, and on the right Side of the Patient; and laying the Point of the Needle, which he holds with the right Hand, likewise at two Lines distance from the Division, in the lower Part, and on the left Side of the Wound, he shall pierce both Lips at once, conveying the Needle into the Middle of the Thickness of the Lips, as much as he can, without quitting the Port-Needle: He withdraws the small Ring; and the Instrument leaves the Needle: He lays again another Needle upon the Port-needle, always surrounded with a small Piece of Linnen or Paper, that the Port-needle, which must compress a hard Body, may find a soft intermediate Body to help it in that Action. This Mechanism is very well imitated by those Workmen, who make Use of the Vice; for they surround with a Felt the hard Bodies they have a Mind to squeeze, that the Vice may have a better hold, and the Body may be tighter. The Surgeon shall therefore pass that second Needle thro' both Lips, and in the same Manner, laying it between the first Needle, and the upper Angle of the Wound.

To bring the Lips of the Wound more exactly near one another, and keep them so, a Thread, or two or

three small Needlefuls of waxed Silk must be twisted about the Needles. Some begin with the lower Needle, and others with the upper one, which is indifferent. I would chuse to apply the Middle of the waxed Thread about the lower Needle, and cross it between the upper Needle, to surround it afterwards, as well as the first. I would do the same with the third, if there was one, and go down towards the lower Needle, where I would stop the two Ends of the Thread with a single Knot, and a small Loop.

BEFORE the Surgeon proceeds further, it will not be amiss to wash the Patient's Mouth with proper Liquors, such as a Barley-Decoction with *Mel rosatum*, injected with a Syringe; and then the Surgeon cuts the Points of the Needles with incisive Tongs, and puts some small Pieces of Sponge under the Needles. Mr. *Arnaud* prefers them to the Compresses, that are commonly used, because, says he, they may be better adapted to the Figure of the Part.

MR. *Petit* does not use the Helps, which I have said to be proper for both Hands: He thinks they are too cumbersome and inconvenient; and therefore he has contrived Needles like larding Pins: They are large, and give the Surgeon so great a hold, that he may be without the Port-needle and the *Cannula*.

AFTERWARDS, the Dressing begins with a small Piece of fine Linnen dipt in warm *Mel rosatum*, and adapted between the Lip and the Gum, in that Place where the Frænum has been cut, to prevent the two Parts from sticking to one another. He goes on with the Dressing, pouring upon the Suture some Drops of the *Commandeur's* Balsam; which is the most proper, because as it dries up, it forms a Crust, by which the Air is kept out, so that it cannot corrupt the nutritious Juice. The Surgeon applies a small soft Plaget dipt
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in the same Balsam, and a small Compress somewhat long, imbibed likewise with that Medicament. He supports the whole with a Bandage called the Sling, or with the End of a Fillet, a Foot and a half long, and about three Inches broad, and cut in the Middle, that the Nostrils and the Mouth may have a free Respiration.

THE Bandages must be pinned to the Patient's Cap; but it ought to be observed, that the Suture alone is more than sufficient to keep the Lips of the Wound united together; and consequently that the Bandage is only designed to keep in the Remedies, and not to press upon the Parts; and therefore that it must be tight for no other Reason than to keep the Dressing upon the Wound. According to this Practice, we reject the unitive Bandages, which Authors advise us to bind very carefully; and we prove by demonstrative Reasons, grounded upon the Structure of the Part, that they must needs be very prejudicial, as well as the Sling and the notched Bandage, when they are too tight. Here follows the Reason of it. All those Bandages have their resting Point upon the Needles, and cannot be straitened, but the Needles will press the In-side of the Lip against the Teeth; which will occasion a Bruise in the In-side of the Lip, attended with a Pain, and a Reflux of the Spirits towards the Brain, that will quickly be follow'd by a Return towards the Part; and consequently the Pain will increase more and more, and be attended with an Inflammation, an *Erysipelas*, a Fever, Convulsions, and a *Delirium*. In a Word, to preserve the Patient from Death, the Bandage and the Suture must immediately be untied, if those bad Symptoms continue ever so little.

THE Patient must go through a strict Course of Diet, being only nourished with Broth, to be taken with an open and flat Spoon. Some Spoonfuls of Jelly must be put into the Broth, to support him better. He must be blooded two or three Hours after the Operation, if it be thought proper. He must neither speak nor laugh, nor cry, nor do any thing, that may put the Lip into Motion. He must take some Clysters now and then, and the two or three first Days in the Evening an Emulsion, or Julep, with some *Laudanum*, or Syrup of Poppies in it, to quiet the Blood and promote Sleep.

IF there has been no Occasion to take off the Dressing, it must be taken off the second Day ; and the Surgeon must take care not to pull the Plaget, or the Compress, but to imbibe them with warm Wine, that they may come off almost of themselves. If the Thread is too tight, or too loose, it must be made looser or tighter, as the Case requires, and the Wound must be dressed in the same Manner as I have already said.

THE following Days, it will be sufficient to moisten the small Compress, and the Plaget with the Balsam, without taking them off from the Wound ; and Care ought to be taken to put every Day a small Piece of fine Linnen, dipt in *Mel rosatum*, between the Gum and the Lip. On the fifth or sixth Day, the Surgeon must take off the Dressing ; and if he perceives a Re-union, and that the Needles begin to shake, he must remove the Thread, and leave only the Needles one Day longer, if he thinks fit. Lastly, when he takes them off, he must convey two Fingers of his left Hand near the Lip, on the Side of the Needle, for fear of breaking that Re-union, which is still very tender. Afterwards, he is to use a
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small Syringe with a very small *Siphon*, to inject some Balsam of *Fioravanti* into the small Eyes of the Needles, to drive out the *Pus*, and close them up again. Besides what has been said, a small and thin Compress, dipt in the Balsam of *Fioravanti* ought to be applied upon the Scar, and supported by the unitive Bandage, which is now very proper, since the Suture is removed; and it will bring the Lips nearer one another: This a Servant ought to do at every Dressing, by pressing the Cheeks gently.

M^R. *Arnaud* performed that Operation upon a Man, who had no fore-Teeth, and consequently he wanted a propping Point to facilitate the Passage of the Needles. He supplied that Defect by putting under the Lip a Plate of Lead broad and thick enough to resist the Passage of the Needles, and to serve as a propping Point.



C H A P. XXXIV.

Of Cancers, and shankery Pustules which happen sometimes in the Lips.

THE Glands of the Lips, as well as those of other Parts, are sometimes distended, and form Tumors or shankery Pustules; which oblige the Surgeons to take off a great deal of the Substance of the Lips, to remove the Disease intirely, and deliver the Patient from an Evil, which would be attended with very bad Consequences. 'Tis true, we are forbidden by Authors to make the twisted Suture in the Lips, when there is a great Loss of Substance:

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But since I have already proved, that wherever the Parts are loose, and yield much, they may be brought together, and a Suture may be made in them; I shall not scruple to take off a great deal of Substance from them, to remove the Disease with which they are affected, and to make the twisted Suture in order to re-unite them, as it will appear by the two following Instances.

A Person, who was a Patient to Mr *Arnaud*, had a Cancer in the lower Lip, almost over against the Eye tooth. That Cancer was at least as big as an Egg. To take off that shankery Tumor, without leaving any thing, that might occasion a Relapse, that Surgeon put the fore-Finger of his left Hand between the Gum and the Lip, and conveying a Branch of probe Scissars upon his Finger, he made an Incision on the Side of the Basis of the Tumor, the Direction whereof was oblique, and about two Inches long. Without moving his fore-Finger from under the Lip, he conveyed it on the other Side of the Tumor, to make another Incision, which was indeed oblique, but quite opposite to the first, since the upper Part was at a great Distance from it, and the lower one was next to it, so that both Incisions together made an Opening, whose upper Part was an Inch in Diameter, and the lower one represented an acute Angle.

MR. *Arnaud* removed the whole shankery Tumor by the Waste he made in the Lip; but he quickly repaired it, by bringing the Lips of the Wound near one another, and passing a Needle towards the lower Part of the Division, observing the Circumstances above mentioned, when I spoke of the Hare-lip. Afterwards, he put a second Needle towards the upper and middle Part of the Wound and a third very
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fine Needle on the Edge of the Lip, to make the Re-union more perfect.

THERE was no Need of any Help for the left Hand, because the Hand alone could resist the Impulse of the Needle. Mr. *Arnaud* twisted some waxed Threads about the Needles, and laid the Dressing, as tis practised in the Hare-lip; and that Operation had a wonderful Success. The Patient was cured in a Week; the Needles fell off almost of themselves: They might have been taken off sooner; but they were left on, that the Division might have more Time to be re-united. Mr. *Petit*, and Mr. *le Dran* were consulted about that Operation.

MR. *Petit* took off a shankery Pimple lying in that Place where the *Zygomatick* Muscle passes, a little above the Closure of the Lips. He put a Finger under the Lip, as I have said before, and conveying probe Scissars upon his Finger, he cut the Skin, and the Flesh of the Lip, that touched the upper Part of the Tumor, I say, he cut them almost horizontally, and a little beyond the Tumor; and without removing his Finger from under the Tumor, he made another Cut with the Scissars, which began in the same Place as the first, and ended at the lower Part of the Middle of the Tumor. Lastly, he made a third Cut with the Scissars, which began at the End of the latter, and made a very acute Angle with the Extremity of the first Cut; so that those three Cuts, which wholly took off the Tumor, were like an *Isosceles* Triangle.

AFTERWARDS, Mr. *Petit* made it his Business to re-unite that Wound, bringing the Lips near one another, and holding them in that Situation, with the Help of the twisted Suture. He put the first Needle

in the Place where the Lips join, to lessen the Deformity : He began to stop it, by twisting the Thread about it : Afterwards, he placed the second Needle in the Angle of the Middle, to bring over the inferior Lip, which was more extended than the upper one : He put a third Needle towards the Angle opposite to the Closure of the Lips, and introduced those Needles with the waxed Thread, as in the Hare-lip.

IF in such a Disease the three Needles should leave any Looseness in their Interval, the Surgeon must pass some Needles into it, to bring them over, and by that Means the two Lips of the Wound will be exactly re united.

IT ought to be observed that the Needles must be driven into the very Middle of the fleshy Fibers, that the Re-union may be better made, and the Suture be stronger. The Needles must be of Silver, and pretty long, because the Contractions of all those Muscles make sometimes great Efforts ; which ought to be minded in the Hare-lip.



CHAP. XXXV.

Of the Polypus.

BY a *Polypus* in the Nostrils we mean a seeming fleshy Excrecence, whose Basis is narrow ; and which, as it grows bigger, is commonly divided into many Branches. The Surface of that Excrecence appears very smooth ; and sometimes it grows so big, that it stops the Cavity
of

of the Nose, and hinders Respiration. Nay, sometimes some Branches of it spread themselves outwardly, and others get into the Mouth, behind the Partition of the Palate.

THE Causes of the *Polypus*, according to most Authors, are the internal Membrane of the Nose, which, say they, is very thick, spongiouse, penetrable, and imbibed with a tenacious and glutinous Humor; so that a pituitous and crude Blood, as they suppose, impregnated with viscous Particles, either from an indigested Food, or from other Causes, being forced to run thro' that Membrane, obstructs, and relaxes it, divides some Fibers, and by that Means occasions a *Polypus*.

I don't know whether this Explication be satisfactory, and sufficient to resolve all the Objections that may be raised.

THE pituitous Membrane of the Nose is indeed moistened by a thick *Lympha*, which keeps its small nervous *Papillæ* pliant, and serves, as it were, instead of a Varnish to secure them from the dangerous Approach of odoriferous Bodies. But it does not follow from thence, that the thick *Lympha*, which moistens the whole internal Membrane of the Nose, divides and relaxes its Fibers to such a Degree, as to occasion a *Polypus*; for if this was true, the *Polypus* would have its Original in the whole Extent of the pituitous Membrane, which has so many different Foldings; and it could never be cured, either with Causticks, since they could not be conveyed into all the Foldings of that Membrane, or by Extirpation, since it would always be attended with an Hemorrhage on so many Sides, that it could not be stopped. And yet we see the contrary, since we know by the Operation, and by

the Examination of a *Polypus*, that it has its Original only in a certain Part of the Nose, and that its Basis is usually very narrow.

BESIDES, if the pituitous, crude, and viscous Blood, which circulates in that Membrane, was together with that Membrane the Cause of the *Polypus*, it would take up the whole Membrane, as I have already said, since that raw and viscous Blood does equally circulate in every Part of it. But besides the Impossibility of the thing, all Physicians and Anatomists are agreed that the Blood is the same in all the Parts of the Body ; and that the Blood conveyed into the internal Membrane of the Nose, for Instance, is not more pituitous, crude, and viscous, than that which is conveyed to the Feet. Therefore, the Blood of it self is not more apt to occasion a *Polypus* in the Nose than in the other Parts.

ONE may draw from those two Arguments some Consequences, which plainly shew that the pituitous Membrane of the Nose, and the Blood cannot be the only Causes of a *Polypus*.

ALL Authors acknowledge that there are hard, schirrous, and shankery *Polypus*'s ; that they ulcerate sometimes, and that they are painful, and generally incurable.

SINCE those Diseases are so like a Cancer, 'tis likely their Cause is the same as that of other Cancers, which are all incysted Tumors, as I have shewed at large, when I discoursed of those different Diseases ; and I said then that all those Sorts of Tumors began with a glandulous Tumor.

THIS Opinion appears the more probable, because the pituitous Membrane of the Nose is provided with a vast Number of small Glands, the *Tomentum* whereof, or the *Vesicle*, as some will have it, is imbibed,
from

from the very first Conformation, with a Humor perfectly like the thick Lympha, which moistens that whole Membrane; so that the Blood running thro' the small Glands, leaves in them that Serosity which we observe in the internal Membrane of the Nose.

IF any of those small Glands happens to be distended, by reason of the nutritious Juice, and Lympha, that are grown thick in it, either thro' their own Defects, or thro' the bad Disposition of the Gland it self, there will follow an Obstruction, whereby the Course of the Liquors will be stopped, and the Gland more and more distended.

THAT Gland being swelled, it follows that the Membrane will be very much distended, and will strongly compress the Vessels, that convey the Blood or the Lympha into them; but those Vessels which convey the Blood, will be less compressed, especially the Arteries, because they have a Motion of Dilatation and Contraction, which forces the Blood into the Gland. But the lymphatick Vessels, especially those that creep upon the Membrane of the Gland, being compressed, will let out thro' their Pores the Serosity of the Lympha, whereby that Membrane will grow loose, stretch out, and yield to the Impulse of the Blood and nutritious Juice, the more because they stay longer in it than usually. Thus the Gland, that forms a *Polypus*, will grow by Degrees.

AND because the Fibers of the glandulous Membrane relax more and more, by reason of the Serosity of the Lympha, which continues to diffuse it self, and of the nutritious Juice, which accumulates continually, 'tis plain they must yield to the Impulse of the Blood, and grow very bulky; and therefore the *Polypus* will encrease more and more.

SINCE the Serosity, that is diffused by reason of the Distention of the Gland, falls only upon few Fibers, 'tis certain there will be but a small Number of them relaxed. And because the Basis of the *Polypus* is more or less extended according to the Quantity of the relaxed Fibers, 'tis plain the Basis of the *Polypus* will be narrow.

BUT the Fibers of that Part which rises, and reaches into the Nose, being very much relaxed, will be apt to spread upon the Sides, especially towards the Out-side, where the nutritious Juice moves more slowly than in other Parts, whereby the *Polypus* will be broader at its Extremity.

THE Gland cannot be distended, without compressing the excretory Ducts of the adjacent Glands; which will also occasion their Distention; and the more easily, because those small Glands lie all in Clusters like Bunches of Grapes; so that the first that is distended, prevailing over the others, will grow larger, and form the Body of the *Polypus*, whilst the others form the Feet, or the Branches, in the same Manner as I have shewed that the Glands lying near Shankery Tumors, being compressed, distend themselves, and form the pretended Roots of the Cancer.

LASTLY, because those Glands are covered with a smooth and polished Membrane, and because that Membrane has undergone no other Change but a greater Growth, it follows that it must remain smooth, and the *Polypus* will have an even Surface.

THE diagnostick Signs of a *Polypus* are so obvious, that the Sight may judge of them; for if the Patient bends his Head backwards, the Surgeon perceives in his Nostrils a smooth and polish'd Tumor, sometimes of a dark red, at other times of a more lively red, and frequently

frequently of a whitish Colour, with a Motion answering the Inspiration and Expiration. If the *Polypus* be considerable, the Nose will be larger than usual; the Patient will speak through the Nose, and frequently open his Mouth, especially in his Sleep, to breathe more easily.

THE prognostick Signs of a *Polypus* depend upon the Nature of the Tumor. A hard, livid, and painful *Polypus* is of the worst Sort, and generally becomes shankery; for it cannot become so 'till the Blood is grown thick, and impregnated with gross Salts, which for want of *Serum* getting rid of the Blood, will acquire a Motion, and corrode the Fibers of the Membrane and Gland. Authors forbid meddling with those Sorts of *Polypus*. Those that have Feet or Branches in the Mouth, are hard to be cured; but those that are free from Pain, reddish or whitish, without any Hardness, and seem to have but few Adherences, may be more easily extirpated, especially when they are not rooted far in the Nose. Besides, one may judge of them by the Patient's Facility of breathing.

C H A P. XXXVI.

Of the Operation of the POLYPUS.

A *Polypus* is destroyed two Ways; by the Operation, and by the Caustick.

Mr. *Petit* advises to consume those, that are short and broad. Those that may be extirpated, may also be consumed.

Mr. *Thibaut* uses a Caustick, which has an immediate Effect. He takes two small Plaisters, and applies them inwardly between the *Polypus* and the internal

ternal Coat of the Nose, to keep the Cartilages of the Nose at a Distance from the Caustick. Afterwards, he makes a small Sprinkle, with which he takes Butter of Antimony, laying it upon the *Polypus*, and taking care not to affect the adjacent Parts. The *Polypus* must be washed with Water; because the Caustick would occasion some Disorder: That Remedy works immediately.

If we judge of the Extirpation of the *Polypus*, according to what *Fabricius ab Aquapendente* says of it, we shall conclude that it may have a good Success; since that Author, who gave us the Figures of the first Forceps made use of to perform it, affirms that he did it very often, without any Accident ensuing from it. However, we must not blindly follow the Prescription of that great Man, and we ought to mind the wise Counsel of Mr. *Arnaud*, who says, the Extirpation of a *Polypus* has sometimes been attended with such a considerable Hemorrhage, that it was impossible to stop it; and the Patients died, without any Possibility of being relieved. Wherefore the Surgeon ought to use all imaginable Care, to prevent that Mischiefe.

BEFORE the Surgeon undertakes that Operation, it will not be amiss to prepare the Patient for it; and because we are afraid of an Hemorrhage, that Accident may be prevented in a great measure by Phlebotomy, which lessens the Quantity of Blood.

GENTLE Purges must also be used, to clear the *primæ viæ*, and dispose them to receive Aperitives, which will divide the thick Lymph, whereby the Gland was distended, and also to absorb the prevailing Acids.

IN order to make those Remedies successful, a wise and experienced Physician ought to be consulted, who, in concert with the Surgeon, shall prescribe

scribe the Remedies one after another, beginning with the mildest.

To perform that Operation well, according to Mr. *Arnaud's* Advice, the Patient must sit upon a Chair leaning backwards, and placed in such a manner that the Surgeon may see as much of the Nostril and *Polypus* as possible. A Servant keeps the Patient in that Situation, laying his Hands cross-wise upon his Forehead; and other Servants hold his Arms.

AFTERWARDS, the Operator takes a *Forceps* blunt at the End, or Mr. *Petit's Forceps*, which I shall describe in my Treatise of chirurgical Instruments. He holds it with his right-Hand, to introduce it into the Nostril, where the *Polypus* lies: He takes hold of the Tumor pretty far, and towards its Basis; and then draws it away by degrees, moving the Hand up and down. When there is a small Part of the *Polypus* out of the Nostril, he makes a Ligature to it with a double and waxed Thread; and then he takes hold of the Tumor with the *Forceps*, to draw it out a little more. He makes a second Ligature above the first; and if he thinks the *Polypus* can still bear a little more pulling without coming quite away, he draws it a little, and makes a third Ligature. He cuts the *Polypus* under this last Ligature, and by that Means stops the Hemorrhage, which has sometimes been so considerable, that the Patients have died of it. The remaining Part of the *Polypus* falls by the Suppuration, in the same Manner as it happens to the spermatick Vessels in the Operation of the Castration. This, I think, is the safest Method to extirpate a *Polypus*.

If the Operator has wholly extirpated the *Polypus*, and some Artery lets out a great deal of Blood, he must stop it immediately, endeavouring to find out that

that Artery ; and he must lay upon it a Dozel tied, and dipt in some stiptick Water, of *Colchotor* and *Bole Armenic*, and above that Dozel several others, that the Artery may be sufficiently compressed.

THE Blood being stopped, the Surgeon dresses the Patient, filling the Wound, for the Space of a Month or six Weeks, either with Tents or Dozels covered with some desiccative Powder, to dry up and compress all those Parts, that might occasion a new Tumor.

ALL this while, the Surgeon must continue to use the Remedies, which I have prescribed for the Preparation. The Patient must keep a strict Diet : He must not be allowed any thing, that is salt, spiced, and acid ; and consequently the Use of most Wines is pernicious. The Surgeon must forbid him to eat any Ragoos, or any thing hard to be digested, and prescribe to him such Remedies and Liquors as contain many volatile Alkalies. Hot mineral Waters are of great Use.

IF the *Polypus* comes down very low into the Mouth, and protrudes the Vale of the Mouth very forward, it must be extirpated thro' the Mouth. That Operation was lately performed by Mr. *Petit*, upon a Child of twelve or thirteen Years of Age. The *Polypus* had been preceeded by such sad Diseases, and was so large, that the Success of the Operation was despaired of. The Diseases with which that Child was affected, were a scrophulous Blood, and the venereal Disease. In order to cure the last, I used Bathing, Frictions, and other Remedies, being assisted with the Advice of Mr. *Le Roux*, sworn Surgeon of *Paris*, and very much experienced in those Sorts of Diseases. The Mercury raised a Fermentation of the Blood and Lympha in some Parts of the *Polypus*, which occasioned small Abscesses in it, and encreased it to such a Degree, that

it stopped in a great Measure the Passages of the Air and Food : So that the Patient not being able to live long, the Operation was resolved upon, and performed by Mr. *Petit* in the Presence of several Surgeons of *Paris*. He began with cutting the Vale of the Mouth in two Places, that he might more easily touch the Ligament of the *Polypus* : Afterwards he cut the *Polypus*, which adhered by a kind of Stalk of the Nature of Cartilages to the *Vomer*, and on the right Side towards the Aqueduct. In the next Place, he plucked it out with a small Iron-spoon, and his Fingers. All those that stood by, were surprised to see a fleshy Tumor as big as the Fist, of a triangular Figure, and like a large Gizzard come out of the Mouth of that Child. After that Operation, the Patient spoke his Words very plain, and slept quietly ; which he could not do before : And, what is most remarkable, he was perfectly cured.



C H A P. XXXVII.

Of the Fistula Lacrimalis.

I Have already said, that by the Word *Fistula* we mean a deep Ulcer in some Part of the Body, the Bottom of which is large, and the Orifice very small, generally attended with a Callosity, which lets out an acrimonious, sanious and serous Matter.

HOWEVER all those Characters do not always appear in the *Fistula Lacrimalis* ; and therefore we define it, a Collection of purulent or serous Matter in the lacrymal Bag, generally without a Callosity, frequently without any visible Orifice, sometimes attended with a small Tumor in the great Corner

Corner of the Eye, which emits, when pressed, sometimes a purulent Matter through the lacrymal Bag, and frequently a Matter perfectly watery.

THOSE Parts of the Body, that are most subject to *Fistulas*, lie generally near the Receptacles, or even Reservatories of some Humors, which by their Alteration produce a *Fistula*. We have seen elsewhere, that the Fat and the Vessels lying near the *Anus* do very much contribute to the Formation of the *Fistula in Ano*; and it frequently happens for the same Reason, that the Glands, the Blood-vessels, and the Sinovia altered in the Joints, occasion that Disease: And if a *Fistula* arises sometimes in the great Angle of the Eye, 'tis because there are already some Tears that may be the Cause of it.

ACCORDING to this System, the *Fistula Lacrymalis* is occasioned by the Alteration of the Tears. But because we have proved that the *Fistulas* of the other Parts are sometimes a Consequence of their Disorder from some external Cause; it follows that a Blow, a Fall, a Compression, &c. frequently occasion a *Fistula Lacrymalis*, as I shall explain hereafter.

THE *Fistula Lacrymalis* is also frequently a Consequence of the small Pox; and then, besides the ill Disposition that may happen to be in the Blood and Tears, some Grains of the Pock that have occasioned Ulcers in the lacrymal Bag, or in the lacrymal Points, will be the immediate Cause of that *Fistula*.

THE Alteration of Tears, that can produce an Abscess in the lacrymal Bag, and all the Accidents following upon it, is, in the Judgment of the ablest Physicians and Surgeons, their Acrimony and Saltness: A Character, which is common to them with the Alteration occasioned by the pernicious Ferments, that corrupt the Blood of People affected with the

King's Evil, the Scurvy, the venereal Disease, &c : And therefore we frequently see that the *Fistula Lacrymalis* cannot be cured without great Difficulty.

THERE is no need of being well skilled in natural Philosophy to explain how acrimonious, salt and corrosive Tears, may occasion an Abscess, and consequently a *Fistula*, since their saline Particles being very gross, and free from Serum, and staying a long time in the lacrymal Bag, must needs irritate that Membrane very much, and occasion a violent Flux of Spirits towards that Part, which straitening it on all Sides, will strongly compress the Blood-vessels, and quickly occasion a considerable Inflammation in that Bag.

TEARS remaining a long time in the lacrymal Bag by reason of the Inflammation, which keeps them on all Sides from coming out, occasion a greater Encrease and Acrimony of the Salts, whereby the Membrane will be more irritated, being already distended by the Inflammation : And consequently the Flux and Reflux of the Spirits being quicker and more frequent, the Inflammation will encrease to such a Degree, that the Blood-vessels, especially the Arteries, will break, as well as the lymphatick ; and from that unequal Mixture of extravasated Liquors there will arise a Fermentation, which will produce an Abscess.

IF acrimonious, salt and corrosive Tears, can be the Cause of so much Disorder, it follows that whatever makes them so, may occasion a *Fistula*. And because Anatomy teaches us that Tears are separated from the Blood through a Gland lying in the upper Part of the Orbit, we ought to infer from thence that whatever communicates a great deal of Saltness and Acrimony to the Blood, may also communicate it to Tears. This we frequently observe in those
who

who are affected with the above-mentioned Diseases ; or they have other Indispositions, such as the Ophthalmy, the *Ankylops*, &c.

THE *Fistula lachrymalis* proceeds also from other Causes ; for it is frequently occasioned by Diseases, which happen near the lacrymal Bag for instance, under an Ulcer in the Nose, which corrodes that Bag, and so produces a *Fistula*. A *Polypus* compressing the nazal Conduct, hinders the Tears from coming down into the Nose ; and those Tears being detain'd in the lacrymal Bag distend it, are vitiated, and are able to occasion the Disorders, which I am going to mention.

AN *Ankylops* that suppurates, goes, as soon as it is opened, by the Name of *Aigilops*, a Disease to which Goats are very much subject ; and when it is ill dressed, it turns to a *Fistula Lacrymalis*. Therefore bad Dressings do also contribute to form a *Fistula*, as it may easily be proved. Those who have a flat Nose, and depressed, are still more subject to a *Fistula Lacrymalis* than others, for the Reasons above-mentioned, when we spoke of the *Polypus*. A Blow, a Fall, &c. upon that Part, may also occasion such a *Fistula* ; because external Causes bring an Inflammation upon the Bag, whereby the Blood is stopped in the Part, breaks the Vessels, extravasates in the Bag it self, ferments, and produces a *Fistula*. There are other Sorts of *Fistulas* ; one called, by Mr. *Petit*, a *Hernia* of the lacrymal Bag, which is occasioned by a small Inflammation proceeding from a Blow, a Fall, or a Compression. And then the lymphatick Vessels being very much compressed, let out through their Pores the Serosity of the *Lympha*, which relaxing that membranous Bag, dilates it, and by that means a Tumor is sometimes formed outwardly, and sometimes inwardly.

THAT

THAT Disease has been called, by a modern Oculist, a Dropfy of the lacrymal Bag; because when the Tumor is pressed with the Finger, nothing comes out but a clear and transparent *Lympha*. But that Name is not very proper for that Disease, since the lacrymal Bag is design'd to receive Tears, and contain them for some Time, in order to convey them by degrees into the Nose through the Channel of the Nose, which is only a Continuity of the Bag. And when the Tears cannot run into the Nose, because the Channel of the Nose is obstructed, or for some other Reason, and when the *Lympha* mixes with them; that membranous Bag is forced to throw it self out of its natural Place, and to form a *Hernia*. In the same manner as I have said, that the Urine being detain'd in the Bladder distends it, and occasions a *Hernia* of the Bladder, and not a Dropfy of the Bladder. For the Bladder being only design'd to contain Water for a Time, it would be absurd to call a Retention of Urine a Dropfy of the Bladder.

MR. *Arnaud* admits of two Sorts of *Fistulas* in general, a true one, and a spurious one. He includes under the true one the different Kind, I have just now described; and by the *Fistula lacrymalis*, which he calls spurious, he means a small Ulcer to be found sometimes at one or two Lines from the Interstice between the two Eye-lids, on the Side of the great Angle, and which has not its Origine, either in the lacrymal Bag, or in the *Os anguis*, but proceeds from a higher Place, as I shall shew by some Instances in the next Chapter.

WHICH way soever the Abscess of the lacrymal Bag be formed, one may always foresee that this small Bag, being full of *Pus*, will compress the Channel of the Nose, and prevent the Circulation of the Blood

in its Vessels, by compressing its Veins, which make less Resistance than the Arteries ; and that there will happen an Inflammation, whereby the Coats of that Channel will be brought so near one another, that it will give no Passage, either to the *Pus*, or to the Tears. Therefore, in a *Fistula Lacrymalis*, the Nostril will be very dry on the Side of the affected Part.

THE *Pus* discharging it self continually towards the Channel of the Nose, and its Salts corroding it continually, they will produce in it some proud Flesh, which will wholly stop the Passage, and occasion again a Driness in the Nostril.

THE *Pus* being very copious in the lacrymal Bag, will issue out of it, as the Blood supplies it with fresh *Pus*, or by the different Compressions that may be made in it. But because its Passage will be stopped on the Side of the Nose, it can only come out through the lacrymal Points : Therefore, in that Case the Eye will be full of Tears, and some *Pus* will come out through these last Channels.

AND because the *Pus* coming out through the lacrymal Points, falls upon a small *Caruncula*, which lies between those two small Apertures ; one may very well guess, it will frequently be covered with it all over ; and that *Pus* corroding it by its Salts, as well as the lacrymal Points, it will irritate, and bring an Inflammation upon them. Therefore, in a *Fistula Lacrymalis*, the lacrymal Points and the small *Caruncula* will be inflamed, and frequently ulcerated.

AND because the Tears and the purulent Matters cannot meet with Resistance on the Side of the Nose, without being forced to gather in a greater Quantity, both in the lacrymal Bag, and about the Eye ; the lacrymal Bag discharging it self, as I have
already

already said, through the lacrymal Points, will still encrease that superabundant Quantity. And the Lacrymal Gland, which lies in the upper Part of the *Orbit*, supplying still the Eye with Tears, even in greater Plenty, by reason of the Irritations of the adjacent Parts, those Tears will be forced to come out of the Eye, and to run down the Cheek, nay they will sometimes be attended with *Pus*, which is a distinctive Sign of that kind of shedding of Tears.

BUT the *Pus* issuing out continually through the lacrymal Points, will at length corrode them to such a Degree, that they will be filled with a spongy Flesh, whereby the Issue of the *Pus* through those small Apertures will be prevented. It will therefore happen sometimes that the *Fistula Lacrymalis* will have no Entrance, which may be further explained by other Proofs.

THE *Pus* cannot be stopped on all Sides in the lacrymal Bag, without corroding it, and making its Way through that Part, which makes the least Resistance: And the Skin that covers the lacrymal Bag making less Resistance, will more easily yield to the Quantity of Matter, which will encrease more and more; and the Salts corroding its Texture, will at length make it so thin, that they will go through it, and discover to us a small Ulcer, not far from the Interstice between the two Eye-lids, and thro' which the *Pus* of the lacrymal Bag will be voided in Part: This will chiefly happen, when the lacrymal Points are stopped.

LASTLY, the purulent Matter corroding still the lacrymal Bag, 'tis plain it will be wholly destroyed in time; and because it touches immediately the *Os unguis*, Part of the *Os planum*, and of the upper Angle of the maxillary Bone, it follows that the *Pus*,

when it touches those Bones, will corrode and rot them. But because its greatest Impression will be made upon the *Os unguis*, and because that Bone is the thinnest, and it has been lately observed that it is not covered with the *Periosteum*, it will be pierced first of all, the small Cells lying behind will be rotted by it, and at last the *Pus* will open its Passage into the Nose. And if the lacrymal Points are then open, the Tears and the purulent Matter taking their Course through the Nose, the shedding of Tears will cease.

THE Prognostick of all *Fistulas* in general is bad, especially of those, which are continually imbibed with some Serosities, such as the *Fistula Lacrymalis*. But the Prognostick of the latter is more or less complicated with the Accidents above mentioned.

IF the Tumor being pressed, nothing but a clear and limpid Water comes out through the lacrymal Points, 'tis a Sign that the lacrymal Bag is only dilated; this we have called its *Hernia*; and it may be remedied by Injections and by Compression, as I shall shew hereafter.

IF the Tumor being pressed, the Water comes out still perfectly clear, and some *Pus* comes out next, there is no reason yet to believe any Corruption; and the Injections and the Compression will still be sufficient for that Cure. But if the Tumor being compressed, nothing but *Pus* comes out, it is not improper to enquire whether the *Fistula* has been in that Condition a long time; for if it be very old, there is good reason to suspect that the *Os unguis* is rotten; and in that Case the Operation, tho' frequently ineffectual, is the only Remedy. If the *Fistula* is recent, the utmost that can be suspected, is Corruption in the lacrymal Bag; and then Injections and the Com-

pression

pression may be tried, without forgetting general Remedies, as I am going to explain.

THOSE *Fistulas*, that are occasion'd by the Obstruction of the lacrymal Points, are sometimes incurable. All those, for instance, that succeed the Small-Pox, are incurable.

WHEN the Tumor being pressed, no *Pus* comes out through the great Angle, but on the contrary through the Nose, 'tis a plain Sign that the Passage of the Channel of the Nose is free; and consequently the Cause of that Illness must be looked for elsewhere.

WHEN a Patient has been troubled with that Disease for a long time, and the Nostril is at first very dry, as I have already said; Lastly, when the *Pus*, having pierced the *Os unguis*, and rotted the small bony *Laminae*, that are behind, to open its Passage through the Nose; I say, when the *Pus* has, as it were, overflowed the small Windings to be found in it, 'tis plain that corrosive Matter has done a great deal of Mischief, which cannot be repair'd by the Operation, even though Fire was applied to the Part; from whence it follows, that this Disease is incurable.

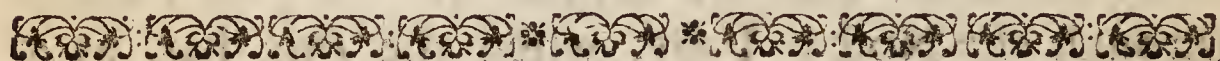
HOWEVER, because the Progress of the *Fistula* is not exactly known; because it cannot be affirmed that 'tis impossible for Surgery to cure it: and because by curing the Ulcer lying in the lacrymal Bag, if it can be done, one may prevent the Ophthalmy and the Pain, which always attends it, since 'tis certain that the Operation is the most effectual Remedy for a *Fistula lacrymalis*, it may be attempted by the Surgeon, who must represent to the Patient and his Friends the Danger of the Disease, and the Improbability of a good Success to cure it radically.

NAY, it is the Surgeon's Duty to call for Advice in

such Cases, in order to secure his Reputation against common Reports, that are only grounded upon Ignorance and Rashness.

THOSE *Fistulas*, in which there has been a Caries, and upon which an Operation has been performed already, are incurable.

BEFORE I make an end of the prognostick Signs, it is not improper to enquire into the Patient's Constitution; whether he be lean and emaciated; whether he has had any Wounds, or had Impostumations before that Disease, that were cured with great Difficulty; whether his Parents were affected with the King's Evil, the Scurvy, or the venereal Disease; or whether he himself be free from them: For the Surgeon must direct his Prognosticks by all those Complications.



C H A P. XXXVIII.

Of the Operation of the Fistula Lacrymalis.

THE Preparation ought to be different, and longer or shorter, according to the different Causes and Complications of the *Fistula Lacrymalis*.

THE Patient must be always blooded once or twice, and gently purged before the Operation. If the Acrimony and Saltiness of the Tears, and consequently of the Blood, are thought to be the Cause of that Disease, the Preparation must be very long, and the Design of it must be to sweeten the Blood, and intangle its Salts. Among the Remedies proper for it, Milk is one of the best: Care must be taken to purge the Patient frequently, and to give him now and then absorbing Opiates.

IF the Surgeon has any Suspicion of a scrophulous, scorbutick or venereal Ferment, he must continue for a considerable time all the Remedies proper for those Diseases.

HE is to prescribe to the Patient, in the time of the Preparation and Cure, a strict Diet; for a great Benefit may be expected from Sobriety and wholesome Food. We know by Experience that a bad Diet has frequently occasion'd the Death of the Patients, or very great Accidents.

WHEN the Tumor is pressed, if nothing but *Serum* comes out, or some *Serum*, and then *Pus*, the Cure may be hoped for, either by Injections, or by Compression.

IN order to make an Injection into the lower lacrymal Point, the Surgeon draws the Eye-lid to lay it bare, and introduces the End of a very small Syringe into that little Hole. Afterwards he raises a little the Hand that holds the Syringe, and makes some small Motions to look for the lacrymal Bag, coming as near the Orifice of the Nose as is possible.

IN order to make an Injection into the upper lacrymal Point, the Surgeon removes back the upper Eye-lid, to discover also that little Hole; and when the End of the Syringe is introduced into it, he raises his Hand gently, and makes some small Motions to look for the nazal Bag, and, as I have already said, comes as near the Orifice of the Nose as he can.

THE Liquors to be used for these Injections, ought to be very clear and mild: Nothing that is caustick, ought to be injected; and if the Surgeon perceives that the Injection occasions any the least Irritation, Pain, or Inflammation, he must give it over.

To cure those two Diseases by Compression, which is but a palliative Cure for the most part, though it sometimes proves a radical Cure, *viz.* when the *Pus* has not yet rotted the Bag, as I have said, speaking of the Prognostick; when its Dilatation is not very great; when those Diseases are new, and the Bones are not at all rotten; I say, the Surgeon must from time to time press the Tumor with his Finger to let out the *Pus*, and then use the Compression immediately: It has frequently proved successful. Mr. *Arnaud* cured many Patients after that manner.

Mr. *Arnaud* proposes for that Compression a Steel Bandage, which is applied upon the Crown of the Head, and a Branch passing over the Coronal, falls upon the Tumor, which the Patient himself can compress as much as he pleases, with the Help of a small Spring, that lies in the Hinge of that Branch.

HERE follows Mr. *Dionis's* Method for that Compression. After he has laid upon the Tumor four or five graduated Compresses, rising above the Nose, he fastens them with a small circular Lint, which pressing the Compresses against the small Bag, prevents the further gathering of the Matter, dries up its Fountain, and enables the Part to recover its Spring, provided that Bandage be used for some Months.

I believe, that if a Piece of brown wet Paper, and chewed, was laid on, before the Compresses, it would exactly compress the Bag in all its Parts, and as it dries, be so well adapted to the Figure of the Part, that the Compression would always be the same, and much more exact.

I imitate therein Mr. *Petit's* Method, who lays outwardly some Lint upon the *Sinus's*, to compress them in all their Parts, as I have said, when discoursing of the Sutures.

I must further observe, that the Compresses ought to be notch'd, that the Eye may have a full Liberty, without being offended by the Compression: I should prefer the *Monoculus*, which I shall describe hereafter, to the circular Bandage of Mr. *Dionis*; because it compresses better, and is not so apt to be displaced and disordered.

WHEN those Methods of Operating have not all the Success that was expected from them, and the Patient is not contented with a palliative Cure; or when the *Fistula* is attended with Complications, that require other Remedies, the Surgeon must proceed to the Operation. He shall put it off for some Days, if there is a great Inflammation in the great Angle of the Eye, that the Anodyns and softening Remedies may have Time enough to mitigate the Pain.

LET us suppose for the Operation a *Fistula* with a Callosity, carious in the *Os unguis*; in the Cells that are behind, in a Part of the *Os planum*, and in the upper Angle of the maxillary Bone; which is one of the most complicated *Fistulas*. In order to perform the Operation proper for such a *Fistula*, the Patient must sit upon a Chair; his Head must lean against the Back of it, and be supported by a Servant's Hands crossed upon his Forehead.

Mr. *Arnaud*, before he begins that Operation, uses a Compress dipt in Rose or Plantain-water, with which he covers the sound Eye, and fastens it with a Handkerchief folded in the Shape of a Triangle, &c. that the Patient may not see the Instruments and the Operation. He covers the sick Eye with a small silver Spoon, which is of great use upon two Accounts; for it has the same Effect as the Compress upon the sound Eye; and besides it stretches the Skin, and draws it a little towards the small Angle, but in
such

such a Manner that it does not change its Situation ; for the Operation would prove ineffectual, when the Skin resumed its natural Situation.

Mr. *Petit* does not use that Spoon, but he bids a Servant lay his fore and middle-Finger near the small Angle of the Eye, in order to draw the Skin, and consequently the two Eye-lids, towards the Ear in a parallel Line.

AFTERWARDS, the Surgeon must bend the Skin above the Tumor, according to its Length, laying the middle-Finger towards the Root of the Eye-brow, a little above the angular internal *Apophysis* of the Coronal, and the Thumb near the middle of the Nose, and a little above and near the Duct of the maxillary Bone, which opens a Passage to the middle Branch of the fifth Pair. The Surgeon, by keeping those two Fingers asunder, will stretch and brace the Skin, and by that means will easily cut it.

THE Incision, that is now to be made, is different, according to the antient Authors and the Surgeons of our Time. Authors, and especially a modern one, advise us to begin it overagainst the Interstice between the two Eye-brows, and even a little lower, in order to preserve the Tendon of the orbicular Muscle, the Section whereof, say they, would occasion a Laceration of the Eye-lids. But the Surgeons of our Time, who are better Anatomists than their Predecessors, have found out that the *Orbicularis* is fastened to the whole Circumference of the Orbit ; and Mr. *Arnaud* has observed from his own Experience, that the Section of one of its Parts could not relax it.

ONE may add to that Argument grounded upon the Structure of the Part, that if the upper Angle of the Incision began a little below the Conjunction of the

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the two Eye-lids, it would exactly be in that Place which ought to be most dilated, and that the Lips of a Wound, of a Figure almost longitudinal, cannot be so well kept asunder in its Angle, as towards the Middle of it.

MR. *Arnaud* and Mr. *Petit* advise us to make that Incision of a Figure half spherical, the convex Part of which will be towards the Nose, and the Concave towards the Eye. The upper Angle of that Incision will begin at the Root of the Nose, I mean, upon the angular internal *Apophysis* of the Coronal, and will be conveyed in a semicircular Figure upon the Side of the Nose, or passing over the Tumor, it will end upon the maxillary Bone almost at the Original of the *Obliquus parvus*. The Surgeon must take care that the Middle of that Incision, which ought to be an Inch long, be about three Lines distant from the Conjunction of the Eye-lids; for the Laceration of the Eye-lids is occasioned by the Destruction of that Conjunction, and not by the Section of the Tendon of the Orbicularis, as we shall see from the following Instances.

MR. *Arnaud* had under his Care a Patient troubled with a *Fistula Lacrymalis*. He made the Incision according to the Method described by Authors; and consequently he avoided the Tendon of the Orbicularis, and yet the Eye remained lacerated. Inquiring into the Causes of that Deformity, he observed that he had made the Incision according to the Rules prescribed by Authors, and too near the Conjunction of the Eye-lids; so that the Suppuration, which happened in the remaining Part of the Skin, whereby the Eye-lids were united, having by the Dilatation caused, and the Heat of the Funnel, entirely destroyed it, caused a Laceration.

THE same Surgeon, performing that Operation a second time, took, in order to make the Incision, all the Dimensions I have just now prescribed. He worked under the Skin, and wholly cut the Tendon of the Orbicularis, taking Care to preserve the Skin, and make his propping Point upon the Bones of the Nose; and the Patient was cur'd without any Deformity. From whence it may be inferred that the Operator need not be afraid of cutting the Tendon of the Orbicularis; but he ought by all Means to avoid cutting the Conjunction of the Eye-lids. Let us resume our Discourse.

THAT Method of operating is of great Use upon two Accounts. As to the first Use, the Surgeon must know that a *Fistula Lacrymalis* is sometimes occasioned by some Defects which proceed neither from the Bag, nor from the lacrymal Points, but from a Rottenness of the upper Bones, such as the *Os planum*, or the Angular *Apophyses* of the Coronal; so that 'tis impossible to cure those Diseases, unless the Remedy be applied upon the Part affected it self. This the Surgeon may do, if he begins the Incision about those Parts, as I have said, because when he discovers the Fountain, he may dry it up.

THE second Use arising from that Method, is that the Surgeon may dilate the Wound in the *Fistula*, since it lies in the Middle of the Incision.

THE Instruments to make that Opening are different according to the Operators. We are told in Books, that it ought to be made with a strait *Bistouri*, fastened to the Handle with a Fillet. Mr. Arnaud uses his small *Poniard*; but that able Practitioner, having observed that the Blade grew blunt upon the Bones, before the Operation was finished, has contrived an Instrument, the End of which is made like a *Spatula*. Mr. Petit uses a very small *Bistouri* some-

somewhat crooked : He drives it in, as far as the Bone; in the Place above mentioned, and continues to open the Part as I have said. Before he quits his *Bistouri*, he enlarges the Wound under the Skin, to cut the Tendon of the Orbicularis, which is hurtful in the Operation. Afterwards he uses a Fleam or a Myrtle Leaf, which he carries up and down several times in the Wound, in order to dilate it. He takes again the *Bistouri*, to make an End of cutting what might have been left the first time, and conveys it into the nazal Duct, holding it like a writing Pen, the Edge being turned towards the Inside of the Hand : There he cuts a small kind of Bridle lying upon the Edge of that Duct, and formed by a Folding of the *Periosteum*. And because in such a Case the *Obliquus parvus* is divested of Fat, it ought to be cut; for it is troublesome to the Operator.

IF the Surgeon, when he makes that Incision, perceives that the angular Vein is varicous, he must cut it; if not, he may preserve it. He must have many small Pieces of Linnen to wipe the Blood, as it comes out; for a Surgeon ought to perform his Operations, as dry as possible.

IF he has opened the Angular Vein, he must make a Compression towards the Angle of the Coronal, because it proceeds from thence. But if the Hemorrhage proceeds from an Artery, the Compression ought to be made upon the maxillary Bone in the lower Part of the *Orbit*; because the Artery, that goes to the great Angle, passes that Way. Afterwards, the Surgeon dresses the Wound with Dozels, the first of which must be tied, till the next Day when he makes an End of the Operation.

THE Compression and the Dozels having dilated the Wound very much, and stopped the Hemorrhage,
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the Bones appear bare the next Day, and the Surgeon sees those Parts that are damag'd by the Caries.

THERE are several Ways of destroying that Caries; some are for applying Causticks, such as corrosive Powders, stiptick Waters, &c. Others are for taking it off altogether. The latter, whose Opinion seems to be more reasonable, teach us two Ways of performing that Operation, each of which is approved by some. The first Method consists in piercing the *Os unguis* with Fire. The Favourers of that Operation acknowledge that it is the most perplexing and the most troublesome, but the safest, because, say they, Fire divides the Bone into such small Parts, that it exfoliates intirely. Besides, the Escar, which happens in the adjacent Parts thro' the Action of the potential Caутery, leaves, by falling off, a way for the Conveyance of the Tears into the Nose; which does not happen, when the Bone is removed without the Help of Fire, for a new Way must be made for the Tears to pass into the Nose, since the lacrymal Bag is destroyed, otherwise there would still remain a Weeping.

THE Favourers of the second Method, which consists in piercing the *Os unguis* with a Stilet, or some other Instrument, say, it is more easy, more speedy, less perplexing, and as safe as the other, since they can break the whole Bone, take the Splinters out of it, and keep in the Nose a Sponge or a Tent, as well as in the other Method of operating.

IF the potential Caутery be resolved upon, Mr. *Arnaud* proceeds in the following Manner. Having covered the sound Eye of the Patient, and placed him upon a Chair, as I have already said, he calls for a Bason full of Water, which will be of great Use, as we shall see hereafter. Afterwards, he conveys a

Stilet

Stilet upon the *Os unguis*, laying it from the Temple towards the Nose, to avoid the maxillary Sinus; which being done, he conveys, with the help of the Stilet, a small Funnel with a Handle to it, the End of which is cut sloping, that it may be adapted to the inclined Plane of the *Os unguis*. The Funnel, by that Means, leaning fast upon the Bone, the Operator takes the largest Cautery, which ought to be red hot, and conveys it upon the Bone with the help of the Channel of the Funnel, taking care not to bear too hard, (for the *Os unguis* is not thick,) but to move it gently, to make way for the Funnel.

THE Cautery is to be turned toward the Nose, to avoid piercing the maxillary Sinus, whereby the Separation of the Snot would be prevented, and the Operation would prove ineffectual. Besides, the Cautery must not remain too long in the Funnel; for the latter growing hot burns the Skin, which re-unites the Eye-lids; And this is the true Cause of the Laceration. The Surgeon must therefore remove the Cautery and the Funnel, to put them both into the Bason full of Water.

AFTERWARDS, he wipes the Funnel, and lays it again on the Bone; which may be done without the help of the Stilet, because the first Cautery has already opened the Way. The Operator cauterizes the Bone again with a smaller Cautery, and perceives that it is pierced by the Blood and Smoak coming out through the Nose.

IF the Surgeon designs to pierce the *Os unguis*, without applying Fire, he must use different Instruments. Mr. *Arnaud* pierces it with a grooved Probe, open at the End, and says, it must always be conveyed from the Temple towards the Nose, and not towards

wards the Cheek, for fear of offending the maxillary Sinus; which has happened to able Surgeons.

MR. *Petit* uses his Fleam, or a myrtle Leaf, with which he thrusts the *Os unguis* towards the Nose to pierce it; which is no very difficult thing, because that Bone is very thin. Afterwards, he moves his Hand up and down to the Right and to the Left, to break it and wear it entirely away. One may perceive, it is well pierced by the Blood, that comes out through the Nose.

THE Surgeon lays that Instrument aside, and takes Pincers to remove the bony Pieces, as much as he can; and because in the following Dressings some of those Pieces come off, he is to attend carefully during the four or five first Days to take them out.

HAVING mentioned all the different Operations, I proceed to the Dressing. Mr. *Arnaud* lays at first a Piece of prepared Sponge, as big as the grooved Probe, pretty long, and tied at one End: He conveys it as far as the Nose, and leaves it there two Days. Mr. *Petit* uses a very small Dozel, or a Roller of Linnen, tied in the Middle with a double Thread: He thrusts it as much as he can with his Fleam into the small Hole, he has made in the *Os unguis*. Upon that Dozel he lays another of Lint, and at last seven or eight, which he fills up and dilates the Wound very much; taking Care always to keep the fore and middle Fingers upon the Dozels, to take them off but one after another, in order to put in new ones, to thrust them always towards the Bone of the Nose, and to keep the Eye free. Upon those Dozels he lays a small Comprels notched on the Side of the Eye, and thick enough, and then another somewhat larger, a third, a fourth, and so on, till they rise above the Angle of the Coronal,

ronal, and above the Nose, that the Bandage may only straiten the Compresses, and have its propping Point directly upon the affected Part. The Surgeon covers that Dressing with two large square Compresses, and supports the whole with the Bandage called the single Eye, which I am going to describe, or by the *Monoculus*, of which I shall give a Description, when I come to discourse of Bandages.

Of the Bandage called the single-Eye.

THIS Bandage is made with a rolled Band with one Head, eighteen Feet long, and two Inches broad. The Surgeon applies the End of the Band to the Nape: He bids a Servant hold it there, or ties it to the Cap. He conveys the Globe of the Band under the *Os malæ*, which lies on the Side of the affected Part, to ascend obliquely to the great Angle of the Eye; taking care that the Middle of the Band lean upon the Compresses, that the Compression may be more exact and stronger. Afterwards, he conveys the Head of the Band to the Nape, passing obliquely over the upper Part of the Parietal, which lies on the Side opposite to the Illness. He makes again two Turnings like the foregoing, taking care however that the Band be slanting in its Ascent, from under the *Os malæ* to the Root of the Nose, and that in their Descent they may be from the Root of the Nose to the Top. The Middle of the Band, in these two Turnings, as well as in the first, must pass through the Middle of the great Angle of the Eye, and upon the Compresses. Afterwards, the Surgeon turns the remaining Part of the Band about the Head.

THAT Bandage is called the *single Eye*, because it covers but one Eye. It may serve to contain some

Medicaments, and for the Operations to be performed in the great Corner of the Eye. I have often seen Mr. *Petit* make it for a *Fistula Lacrymalis*. That Surgeon does not convey at first the End of the Band to the Nape; but bids a Servant hold it upon the Middle of the *Clavicula*; and when the Bandage is made, he reverses that End of the Band, drawing it a little hard, to tie it to the Nape: By which means it is faster still.

THE Cure of that Disease consists, first, in bleeding the Patient two Hours after the Operation, and then in dressing him every Day, much in the same Manner. And because there grows a kind of granulous Flesh in the Interval of the Unequalities of the broken Bone, they ought to be consumed with the *Lapis infernalis*, and likewise those, that arise upon the Bone, which are only proud Flesh. Wherefore we are for making always a great Compression, in order to prevent their Growth; and when the Bone is exfoliated; (which may be known by the Flesh which arises from the Bone it self, and adheres strongly to it, which is not of such a lively Red, and which appears to be solid, when touched with the Stilet, and occasions no Pain;) then, I say, this Flesh may be allowed to grow. But, that it may be solid and good, and may not grow too fast, the Surgeon is to rub it over every Day with the *Lapis infernalis*, and to lessen the Compression by Degrees.

THE Patient must be regular in his Diet; and if the Suppuration appears to be plentiful, the Surgeon ought to doubt of the Cure, and believe that the Mass of Blood is corrupt. Wherefore he must repeat Phlebotomy, purge the Patient from time to time, apply a potential Caustery to the Nape, or upon the Tendon of the deltoid Muscle. It is a powerful

erful Remedy, authoris'd in that Case by the Practice of *Fabricius Hildanus*, one of the greatest Surgeons we have had, and who has left us a great many fine Observations. Nay, the Cautery, or the Seton ought to remain for some Months after the perfect Cure of the *Fistula*; and when it is to be cicatrized, the Patient must be purged several times. Vesicatory Plaisters may also be applied behind the Ears, or between the Shoulders, and should be made to run as much as possible.

BECAUSE the Blood is dissolved and serous, and because it keeps up the Ulcer by a plentiful Suppuration, and frequently makes those Diseases incurable, as I have often observed, though the ablest Surgeons, whom I have so often quoted in this Treatise, had performed the Operations, and used the potential Cautery, or Instruments to pierce the Bone; I say, the Surgeon must destroy the Salts, which divide the Blood, absorb the acrimonious Serosities that overflow it, and restore its original Texture. This is what makes it requisite to prescribe convenient, and frequent Purgatives, Viper and Lobster Broths, sudorifick Ptisans, Milk mixed with a Decoction of *Sassa Parilla*, absorbing Opiats, and frequent Purgations during the Course of all these Remedies.

IF the Surgeon has had the good Fortune to remove the Caries, to dry up the Source of the Pus, and to cicatrize the Wound, it may be said, the worst Accidents of the Disease are over: But whether the Operation be performed with or without Fire, the Weeping continues still, tho' those who approve the actual Cautery, say that by their Method of operating, they open a new Way for the Tears.

I could never apprehend how that new Way can be preserved, and give a free Passage to Tears thro'

the Nose, since it appears that the Wound fills up with firm and solid Flesh (I suppose it to be in a fair Way of being cured,) and consequently there remains no Opening in it. Besides, the Tears cannot pass from the Cavity of the *Orbit*, into that pretended Way, unless the Conjunctive were pierced almost in the Place where it adheres to the great Corner of the Eye, and the Tears ran out thro' its Orifice, to go from thence thro' the Hole of the *Ossunguis* into the Nose; for the lacrymal Bag being destroyed in the Operation, the lacrymal Points are of no further Use. Now this was never done, and never taught.

L A S T L Y, I have seen *Fistulas*, which had been under the Cure of the ablest Surgeons: In some of them those Surgeons used the actual Cautery, and in others mere Instruments, without Fire; in some they could not dry up the Source of the purulent Matter, nor cure the Abscess; in others, which seemed to be better cured, the Weeping continued still. We ought therefore to conclude from those Experiments, either that those Diseases cannot be better cured, or that we are still ignorant of the true Method of doing it.

MR. *Petit* has lately performed that Operation in a very singular Manner, and with a wonderful Success. Instead of attempting to open a new Way for the Tears, (which never succeeds,) he fancied that if the Way, which Nature has given them, could be preserved, those Diseases might be cured without. And indeed, I saw him pass a twisted Wax-candle through the lacrymal Bag, and the nazal Duct, which are the true Passages for the Tears, and make it come out through the Nose. He kept that twisted Wax-candle in those Places, 'till he perceived by the Mat-

ter,

ter, that the Duct was very sound. The Woman, upon whom I saw that noble Experiment made, was cured without any Weeping.

IF that Disease has hitherto given so much Trouble to Surgeons, what Acknowledgment ought they not to express to the learned Practitioner, who has lately facilitated and ascertained the Cure of it?

THAT Operation is frequently performed without Necessity; and therefore it is the Part of a prudent Surgeon carefully to examine the Disease, and all its Circumstances, in order to avoid performing the whole Operation of the *Fistula Lacrymalis*, when a mere Incision can cure it, as it will appear by the following Observations.

The first OBSERVATION.

MR. *Arnaud* had under his Cure a Patient troubled with a Tumor in the great Angle of the Eye, which extended chiefly upon the upper Part of the Bones of the Nose, and upon the rising of the Coronal, which receives those Bones. He made a longitudinal Incision, which took in a Finger's Breadth of the Coronal, and a Finger's Breadth of the Bones of the Nose; so that after the Incision, he perceived that the *Apophysis* of the Coronal was carious, which occasioned the Tumor; and with the Help of Remedies proper for that Caries, he cured his Patient.

The second OBSERVATION.

THE same Surgeon owns that he performed the whole Operation upon a Patient, who seemed to have a true *Fistula*; and after he had practised all the Rules of his Art for the Cure, he was surprised

to see his Labour without any Success. Having endeavoured to find out what prevented the Cure, he perceived a Serosity, which proceeded from a Part above it. This moved him to look for the Obstacle to the Cure, and he found that the Original of the Abscess was in the *Os planum*. He applied upon it a small Dozel dipt in stiptick Water, and then squeezed sufficiently, and the rest, as usually. The Patient was perfectly cured.

The third OBSERVATION.

LASTLY, Mr. *Arnaud* saw a Patient, who had two small Ulcers; one over against the Conjunction of the Eye-lids, in the great Angle of the Eye; and the other, a little higher. He searched the lower Hole with a Stilet, and perceived it did not reach lower. On the contrary, there was in the other Hole a small *Sinus*, proceeding from the Rising of the Coronal, which supports the Bones of the Nose. Mr. *Winslow* calls it the nazal *Apophysis*. The better to secure that Way, he put into it a Piece of a prepared Sponge, which enabled him to introduce the next Day a grooved Probe, and with the Help of that Instrument he conveyed a Branch of the Scissars, and opened it. Afterwards, he made a Dilatation at the Root of the Nose with his Finger, where he perceived a Vacuity, and the Bone carious. He applied the actual Cautery; and there came out, by the Exfoliation, a small Bone of the Bigness of a Lentil. The Patient was perfectly cured.

C H A P. XXXIX.

Of the Wounds of the Head, and the Fractures of the Skull, in relation to the Trepan.

WE divide the Wounds of the Head, as well as those of other Parts, into simple and complicated Wounds.

SIMPLE Wounds are those, that are attended with no Accident, and only require a speedy Reunion, in order to be cured. On the contrary, complicated Wounds do not require such a speedy Cure, and must be differently treated, according to their different Complications.

THE Wounds of the Head as well as those of other Parts, are generally occasioned by pointed, sharp, or bruising Instruments; and those Sorts of Arms include whatever can pierce, divide, break, tear, split, bruise, depress, &c.

PRICKINGS are very dangerous, when they penetrate under those Places where there are hard Bodies: This I shall observe, when I come to discourse of the *Panaris*, where I shall shew that the *Pus* to be found under the Nail, though in the first Sort of *Panaris*, which is generally very simple, requires the Nail to be cut in that Part where the Matter lies, to evacuate it, and put in the room of it some Lint or Linnen, for fear the Unequalities of the Nail should offend the quick Flesh, which is very sensible; and without such a Precaution, the Disease, though very simple in it self, happens frequently to be complicated.

THE same thing happens to Horses, that have been pricked with a Nail, or some other Instrument ; for the *Pus* gathering between the Flesh and the Hoof, the Horse remains lame, and is not to be cured, unless that Part of the Hoof which covers the Abscess, be taken off. The pricking of the Teguments of the Tendons will also afford us remarkable Instances of what I say.

THE Wounds occasioned by cutting and bruising Instruments in the Skin of the Head, and of the Tegument formed by the frontal and occipital Muscles, have often the same Fate, especially when the internal Wound is not so large as the external, and there happens a kind of Constriction. Dreadful Accidents will happen then, and they are attended with sad Consequences, unless their Cause be speedily destroyed ; or when the Patient is under the Care of a Surgeon, who fancies he dresses a Wound according to the Rules of Art, when he heaps up, in a Division, three or four Dozels one upon another.

I saw at my Father's a Wound, whereby this last Instance will be confirmed. A Woman, who lived about four Leagues from *Vitre*, was wounded in the Head by a Ladder of one of her Neighbours : The Wound was an Inch long ; and the Bone was not bare. The Surgeon of the Village dressed that Woman, and the next Day carried her to Town, in order to be visited by my Father, who was the King's Surgeon, that she might know of him the Nature of her Wound. That Wound seeming to be very simple, the Report proved no difficult thing, and the Fees for the Dressing, and Medicaments were taxed at a moderate Price. The Patient went home with her Surgeon, who continued to dress her ; and three or four Days after, there happened

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in that Wound an Inflammation, which occasioned a Constriction in the Skin. That Accident was quickly attended with a violent Fever: The Patient's Eyes grew red and sparkling: She was affected with convulsive Motions and a *Delirium*: She vomited, and voided some Blood through the Nose. The Surgeon being surpris'd at those Accidents, said that my Father had looked upon that Wound to be a simple one, though it was very complicated; and that there was an absolute Necessity to trepan the Woman.

My Father was sent for: He went to the Village, whither I attended him. We took off the Dressing, and removing the Plaister, I drew three or four Dozels, which stuck to the Middle of it: From whence I inferred, that Nature drove away a Heap of Dozels, which made her uneasy. I dress'd the Wound with a Plaget dipt in warm Wine, having no other Medicament; and three Hours after, we were told that the Woman was free from all the Accidents, which had moved the Surgeon to think of trepanning her. In a Week's time, she came to thank my Father, and she was perfectly cured.

To give a further Account of the Accidents, that happen to the Wounds of the Head, and of their Remedies, I must observe that sometimes Blows, Falls, &c. make a Division to the very Bone, and that it is frequently attended with an Inflammation, or an *Erysipelas* all over the Head. That Inflammation is sometimes occasioned by the Constriction of the Skin, as I have already said; and sometimes it is a Consequence of the *Læsion of the Pericranium*; for instance, when the *Pericranium* has undergone a Contusion; or when its Opening does not correspond with that of the hairy Skin that covers it.

THE Remedies of those two Parts being different, it is highly important not to confound their diagnostic Signs, for fear of using Remedies for the hairy Skin, when the *Pericranium* is affected. There is a certain Sign to know which of those two Parts is affected: It consists in examining, whether the Ears be distended and inflamed, or not. If they are affected with an Inflammation and *Erysipelas*, as well as the rest of the Head, there is ground to believe that the Inflammation lies on the Skin, which is the common Tegument of all the Parts of the Head. But if the Ears appear to be in their natural State, one may boldly affirm that the *Erysipelas* and Inflammation affect the *Pericranium*, since it is well known that Membrane does not cover the Ears.

IN the former Case the Remedies are the same as for an *Erysipelas* of the other Parts. On the contrary, in the latter Case, the best Remedy is to open the *Pericranium*, if it be bruised, or to enlarge its Opening, if it be not parallel to that of the Skin.

THE *Echymosis*, or Contusion, which happens on the Teguments, is of two Sorts: One by Infiltration, and the other by Effusion. The Contusion by Infiltration is cured with spirituous and oily Remedies mix'd together. The Contusion by Effusion is differently cured, according to the Cause. If the Effusion be of the venal Blood, it may be resolved; on the contrary, if it be the arterial Blood, the Tumor must be opened. Those two Sorts of Effusions are known; because in the latter the Tumor is harder than in the former, the arterial Blood coagulating as soon as it is out of the Vessels.

By a Fracture I mean a Wound in the Bone; and as I have defined a Wound in the soft Parts, a Solution of Continuity, or a Division of the soft Parts
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of the human Body, recent, and still bloody, made by an external Cause, that can cut, tear, prick, &c. I say, that the Wound of a Bone is a Solution of Continuity, or a Division of the bony Fibers, recent or old, and not bloody, occasioned by some external Violence that can prick, cut, split, bruise, &c.

THE Antients have been pleased to bestow great and puzzling Names upon the Fractures of the Skull: They are such Names as the most experienced Surgeon could not repeat in a Fortnight, unless he made them his chief Study.

I admit in general but three Sorts of Fractures: The first shall be known by the Name of Incision, Mark, or Vestige; the second by the Name of Split; and the third by that of Contusion.

THE first Sort of Fracture, *viz.* the Incision, Mark, or Vestige, is a Solution of Continuity in the Bone, made by a cutting Instrument, which reaches no farther than the Place struck by the Instrument, and is always attended with a Wound in the Teguments. The Blows of that Kind being different, I shall bestow different Names upon them, according to their Differences.

FOR Instance, a Blow with a cutting Instrument, which makes a perpendicular Incision in the Bone, attended with a Contusion, as it constantly happens, is called a perpendicular Mark, or Incision.

WHEN the Blow is given obliquely (I always suppose with a cutting Instrument) and leaves a small Splinter which sticks to the Part, this I call an oblique Mark, or Incision.

WHEN the Blow is slanting, and carries off the whole Piece, that Sort of Fracture is called a Vestige, or an horizontal Mark.

WHEN

WHEN the Instrument, which makes a perpendicular Incision, continues its Effect farther, it makes a Contusion in the external Part, and a Split in the Inside. The same thing happens in the oblique Incision, according to the Difference of the Blow; for if the Blow is not so oblique, the Splinter will not be outward, but inward.

THERE are also Marks upon the Skull, that go by the Name of the Instrument that has wounded it, such as Keys, Ends of Guns, &c. The external Table of the Bone is generally separated, in that Sort of Blows, according to the Figure of the Instrument; and the internal is depressed by a great Splinter.

THE second Sort of Fractures, known by the Name of Split, is a Solution of Continuity in the Bone, and of a Solution of Contiguity, as I shall say hereafter, made by bruising Instruments, that can split and bruise, which reaches beyond the Place struck by the Instrument, and is sometimes without a Wound in the Teguments.

THERE are also several Sorts of Splits according to their Differences. For Instance, if the Split lies only in one Bone, and is so small, and thin, that it resembles a Hair, it is called a capillary Split.

AUTHORS say, that in order to discover it, the Surgeon is sometimes obliged to lay some Ink upon the Skull, and after he has wiped it, he perceives the Split by the Mark which the Ink leaves in it.

WHEN the Split is sufficiently visible, and when the Pieces of the Bones remain in their natural Position, and are not at a Distance from one another, it is called a Crack, or Split; Words very familiar and intelligible.

IF the Occipital is violently struck, and makes a Resistance, there appears a Separation between the temporal

poral Sutures, which we call a Counter-blow, or the Separation of the Sutures; and the remaining Part of the Bone may be split, and then will occasion a Solution of Continuity, or Contiguity, that will have different Names, according to the Differences of the Fracture. On the contrary, if the Temporals make a Resistance, the Occipital must necessarily be fractured, or the Coronal, according to the mechanical Disposition of the Pieces of the Skull, as I shall say hereafter; and the Fracture will also have the different Names just now mentioned; whereby the Counter-blow is still more distinguished.

THE Counter-blow, which I seem to maintain, is a thing very much controverted; and the greatest Part of the Moderns, excepting the learned Mr. *Dionis*, say, *Hippocrates* admits that Fracture without any Ground, and that his Division of it into several Kinds is chimerical.

I shall express a greater Respect for that great Man; and the Readers will acknowledge, as all learned Physicians and Surgeons do, that nothing can be more exact than the diagnostick and prognostick Signs he gives of each Disease, in his *Aphorisms*.

How could he have attained to such an Exactness, admired by all Physicians, if he had not frequently observed those Signs in several Patients, and if he had not appointed one of his Scholars in the House of every Patient, to take Notice of the different Alterations and Symptoms, in order to know whether they agreed with Experience?

'TIS true the Moderns, who call the Counter-blow a chimerical Thing, are Men of great Genius, and Learning, and well-skill'd in Natural Philosophy. But Surgeons, eminent for their Skill in Anatomy, and great Practitioners, shew by the mechanical Structure
of

of the Bones of the Skull, and by several Instances, that the Counter-blow of all Kinds is possible.

By that Accident the Ancients meant, first, a Blow given to the external Table of one of the Bones of the Skull, without making any Fracture in it, and the Violence of which acts upon the internal Table, and breaks it.

Secondly, a Fall, or a Blow given to the upper Part of a Bone without a Fracture in the Place where the Blow was given, but in its lower Part, or that makes a Fracture in the upper and lower Part at the same time.

Thirdly, an external Violence acting with great Force upon a Bone without breaking it, but fracturing that which is contiguous.

Fourthly, the last Counter-blow, which is most controverted, is that which passes from one Part of the Head to the opposite Part. For instance, a violent Blow given to the hinder or foremost Part of the Head, in such a Manner that the Part that is struck, makes a Resistance, and the Fracture happens to be in the Coronal or the Occipital.

To confute those Opinions, the Moderns say, in the first place, that the internal Table of a Bone cannot be broken, whilst the external remains whole, by reason of the small bony Lines which compose the *Diploe*, and so unite those two Tables, that they make but one Bone of equal Resistance.

Secondly, they say, that a Bone having no more bony Fibers in one place than in another, it cannot be fractured in two Places by the same Blow, and much less in that Part of the Bone, which is opposite to the Blow; and if those Fractures have been seen, 'tis because the Patient had received many Blows upon the same Bone.

To answer the third Kind of Counter-blow, they make use of Sutures, as of an intermediate Body, which breaks the Force of the Blow, and does not allow it to reach to the contiguous Bone.

Lastly, they confute the fourth Counter-blow of the Antients, much by the same Argument; and alledge for an Instance, that the Skull is only made up of a great many Pieces, that the Crack of one of those Pieces may not be communicated to any of the others.

THE first Objection of the Moderns is answered, by saying that if the *Diploe* was ossified with both Tables in such a manner, as to make but one Bone, without any Mark of *Diploe*, as I have often seen; then the internal Table could not be broke without a Fracture of the external; but because that mechanical Disposition is not the same in all Skulls, and the *Diploe* is generally nothing else but a marrowy Substance inclosed in small bony Cells, it follows that it cannot unite those two Tables in such a manner, but that the internal will be fractured, when the external, which happens to be more solid, resists the Violence of the Blood. This is explained by learned Philosophers, who alledge the Axiom, *Nullum datur in natura vacuum*; and they say, that a Man having received a Blow with a blunt Instrument, the external Table may yield a little without breaking: By yielding it compresses the Air in the bony Cells of the *Diploe*; and the internal Table giving no Passage to the Air, it will break. Thus that Counter-blow happens, about which most Surgeons are now agreed, and which I shall further prove by the following Instance.

Mr. *Mery* dressed a Wound upon the middle Part of the left Parietal, which at first did not seem to penetrate as far as the Bone. The Patient had an Hemorrhage

morrhage thro' the Nose: His Eyes appeared, as it were, bruised, and very much inflamed: he was affected with a great Fever attended with convulsive Motions. All those Symptoms raised a Suspicion that there was a Fracture in the Skull, and consequently an Effusion upon the Brain.

Mr. *Mery* having made a crucial Incision, found that the *Pericranium* was not adherent to the Skull. The latter was fine, of a lively red, without any Fracture; and because the same Symptoms continued still, notwithstanding Phlebotomy, Mr. *Mery* said, that since the *Pericranium* was not adherent to the Skull, such a thing could not happen but by the Violence of the Blow, which not being able to break the first Table of the Bone, had without doubt broke the second; and therefore he applied the Trepan, though there appeared no Fracture. As soon as the Piece of Bone was taken off, he saw the second Table split, according to the whole Diameter of the Piece, and consequently the Crack reached farther still. He took off a great deal of Blood diffused upon the *dura Mater*, which was almost gangrened; and with the Help of Brandy, and the Care of that great Surgeon, the Patient was perfectly cured.

Secondly, it is still more easy to answer the second Objection than the first; and I can affirm, that there is hardly any young Man, but who has experienced it. I have tried a thousand times to break Boards or Pieces of Wood, holding them in my Hand, and striking them against something hard; and they broke a thousand times in a different Part from that which was struck. Nay, I happen'd sometimes to be in Church-yards, with a Design to separate some Bones of the Head, which I wanted. To that End I took a *Femur*, with which I struck a whole Skull; and I observed

observed sometimes that I made a Fracture in a Bone, three or four Inches under the Part which I struck.

A System is true, when it is grounded upon Experiments ; and if all those who contrive new Systems every Day, would build them upon Experiments, we should not see so many Disputes in Physick and Surgery. It may therefore be said that the Counter-blow happens because the Part of a Bone which is struck, consists of bony *Laminae* so well united, that they resist all together, and do not break ; but the Violence of the Blow reaching the whole Bone, there happens to be a Part, wherein these same *Laminae*, though the same in Number, are less united and firm, and consequently all of them do not equally resist the Force of the Blow, and therefore yield and break.

WHEN I was at my Father's, a Man, about a League from *Vitre*, being struck with a Cudgel upon the upper Part of the left Parietal, fell down upon the opposite Side. The Surgeon of the Place dressed him, and found a Wound in the upper Part of the Parietal, which did not penetrate to the Bone. Within a few Days, the Patient died, and was buried ; but some time after, the Lord of the Mannor ordered a strict Enquiry to be made into the Matter, according to the Custom of that Country. The King's Surgeons were sent for ; and my Father being one of them, I attended him. The Corpse was dug out of the Grave. I opened it ; and the Surgeon who had dressed the Man, shewed me the Wound, in which I perceived no Fracture by the Probe. I took off all the Teguments of the Skull, and viewed the Wound, where I only perceived a small black Spot ; but in the lower Part of the same Parietal there were two Cracks, which met together

at their Ends, and formed a kind of V. I sawed the Skull in its Circumference, according to Custom, and we perceived that the Cracks went through both Tables; but we were very much surpris'd, when we saw in that Part where the Wound was, and where there was a black Spot, the internal Table very much fractured. I observed no Fracture on the right Side upon which the Patient fell.

MR. *Petit*, who has proved publickly, that all Counter-blows are possible in some Skulls, gives us an Account of a Fact in his Practice, not unlike that, which I have just now mentioned. And if the Readers, who are prepossessed in Favour of the Moderns, require further Proofs; Mr. *Lapeyronie* has not long since shewed the Skull of a Man, who died of a Defluxion in his Breast, and who being fallen long before upon the Middle of the Parietal, had a Wound without any Fracture in that Part of the Bone: But all the Signs of an Effusion moved that Surgeon to make Inquiries, which proved very advantageous to the Patient. He made an Incision from the lower Part of the Wound as far as the Temporal; and perceiving a Split in this last Bone, he carried the Incision as far as the *Os petrosum*. Lastly, four Operations of the Trepan, which he applied upon the Temporal, and all along the Split, cured the Patient.

THE Moderns convinced of the Counter-blow by Matters of Fact, have accounted for it conformably to their Hypothesis. They say that a Man being fallen, and having fractured Part of his Skull, loses his Senses immediately; and that when he comes to himself again, he is still so stunned, that he is very likely to get two or three more Falls, and consequently as many new Fractures.

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I don't deny but such a thing may happen; but I can affirm that most of those I have seen trepanned (and those are in great Number, since my Father trepanned seven in one Year, who all of them recovered) did not stir from the Place where they fell; as I was assured by those who saw their Fall, or the Blow with which they were struck. From whence it may be concluded that the Fact objected by the Moderns, which I don't take to be impossible, does not confute those I have just now mentioned.

THIRDLY, to answer the third Objection of the Moderns, I grant the Interposition to be found between two Bones may break the Violence of a Blow, and prevent its reaching the contiguous Bone. Hence it is that learned Anatomists display fine Mechanisms in Osteology, to shew how wise Nature has been careful to secure the humane Body from the Fractures, to which it would frequently have been exposed. However, it ought not to be affirmed that this mechanical Disposition is the same in all Men; for the Sutures may wholly disappear, and make but one Bone of two; and then the Fracture I speak of, will be possible, as I shall shew by the following Observations,

MR. *Arnaud* was sent for to a Man of Note; who fell backwards in his Chamber, and directly upon the Occipital. The Man lost his Senses immediately, and voided some Blood through the Ears. The Physician and Surgeon of the Patient were sent for. The Surgeon finding that the Patient had fallen upon the Occipital, had a Mind to make an Incision in that Part; but the Physician perceiving a small Tumor above the left Ear, said it was more proper to open upon the Tumor, which was done:

and they found a Separation of the temporal Suture, and a Slit in the Temporal it self.

BEFORE they proceeded further, Mr. *Arnaud* was sent for, who knowing the Patient had been found lying upon the Occipital, and that the Blood equally came out of both Ears, said that a Fact of the same Nature, which he had lately seen, made him conjecture the same Complications would appear on the right Side: Which proved true; for they found in it some Fractures not unlike those of the left Side. Those Accidents happened for no other Reason but because the Occipital being very hard and thick, resisted the Violence of the Blood; and the temporal Sutures being almost wholly soldered, were bruised, and the temporal Bone split.

I have seen a Boy about twelve Years old, who fell from the Top of a Tree upon the upper Part of one of the Parietals. Those who saw him fall, affirmed that he had not stirred from the Place; and he lost his Senses: Nay, some Blood came out of the Ear on the Side of the Fall. My Father found no Fracture in the Wound, which was inconsiderable. But there was a large Tumor behind the Ear, on which an Incision was made; and the Temporal happened to be so much fractured, that it was necessary to take off a great Part of the crotaphite Muscle, in order to find out the Illness. The Trepan proved very successful; and the Patient was well cured, abating a small Deformity. For the Surgeon being obliged to take off Part of the crotaphite Muscle, to see where the Mischief lay; in the very Place where its Fibers met, the lower Jaw continued to be a little on one Side, because the Muscle of the opposite Side drew more strongly than that which had been weakened. Let us proceed to the fourth Objection.

FOURTHLY,

FOURTHLY, It is impossible for all the Sutures of the Skull to be wholly obliterated, and for the Bones to be soldered together; as is usual in old Men, and I have seen it upon the Skulls of many dead Bodies, which I opened in the Presence of credible Persons, and upon which there was not any Sign of a Suture. It were in vain, in this Case, for the Moderns to mention the Conjunctions of the Bones as apt to break the Violence of a Blow, and prevent its reaching the Part opposite to the Bone struck. Therefore, in Skulls of such a Structure the Counter-blow may happen, as it will appear by the following Instances. Mr. *Dionis* says in his Operations, that a Groom belonging to the Duke *de Chevreuse*, going to water his Horses, fell upon a Pavement: He lost his Senses, and was carried home. That Surgeon found a Wound upon the Coronal, which he dilated; and having observed a Fracture in it, he trepanned the Patient. That Operation did not recover his Senses; but three Days after, a Tumor appearing upon the Occipital, Mr. *Dionis* trepanned him again. A great deal of Blood came out through the two Openings; and as it came out, the Patient recovered his Senses, and was cured.

THE same Author gives us an Account of a Girl, of nine Years of Age, who was looking upon People playing at Nine-pins: The Bowl being thrown into the Air fell upon her Head. At first, he observed two large Contusions upon the Parietals: He opened the largest, and finding the Bone fractured, he trepanned it. Two Days after, the other Contusion not diminishing, he was obliged to open it, and to trepan, because he found a Fracture in it. The Patient came to herself by Degrees, the Accidents disappeared, and she was cured.

PERHAPS those who read every Day these two Observations in that Author, will say, as to the Groom, that he fell upon one of the Bones of his Head, and that rising up he fell again upon the opposite Side. In answer to the second Observation, they will say that the Bowl fell upon one of the Sides of the Head, and threw down the Girl upon the other Side; so that one of the Fractures was made by the Bowl, and the other by the Fall.

I answer that those Objections are only grounded upon Surmises, and mere Conjectures; and if things had happened in that Manner, the Author would have said so, and not given over the Opinion of the Moderns, to follow that of the Antients, as he himself owns.

THE third Kind of Fracture, known by the Name of Contusion, is a Depression in the Bone, made by a bruising Instrument, that can break and bruise the Bones of the Skull.

ACCORDING to this Definition, there are two Sorts of Contusions of Bones; one, wherein the Continuity of the Bone is not destroyed, as it happens to Children, whose Skulls not having acquired their natural Solidity, yield in the same Manner as a Pewter-pot. That Fracture is called a Depression in the Bone.

THOUGH I have seen a great many People trepanned, yet I never saw that Fracture but in Books, and never heard any able Surgeon say that he had seen it. However, I don't mean it is impossible: The Softness of the Skull of Children may confirm it: But it may be said that the Skull of a Child is not solid enough to bear any Operation, such as the Application of the Tirefond; and therefore I advise the Surgeons not to attempt it without a very great Necessity.

IN the second Sort of Contusion, or Depression, the Continuity of the Bone is destroyed, and there are several Sorts of it. *First*, if the Bone is bruised in such a Manner that there are many Splinters, and consequently many Slits cutting one another at different Angles: This Mr. *Arnaud* calls a great Contusion.

Secondly, The external Table may be bruised and depressed together with the internal: The latter will fly and splinter, as one may see in a Ball that goes through a Board: The Hole through which the Ball went in, is very even; but that Part of it where the Ball comes out, flies, and appears very uneven. In this Sort of Fracture, the Points pierce the *dura Mater*.

Thirdly, There are great Depressions, wherein a Splinter of a Bone lies partly under the sound Bone: This Mr. *Petit* calls a Fracture with Splinters across.

Fourthly, There are Fractures, wherein Part of the Bone sinks as it breaks: This is one Kind of Fracture, which is called a Depression.

HAVING described the Fractures of the Skull, I shall say something of a Disease, which happens in the Brain by a Blow, a Fall, &c. without any Fracture in the Skull. I mean the Commotion of the Brain.

MR. *Petit* says, it happens several ways; for Instance, if any one takes a Man by the Hair, and shakes his Head to and fro, his Brain will be so much agitated, that he will have a Commotion.

It may also be occasioned by soft Bodies, which not being able to fracture the Skull, communicate their whole Motion to the Brain. This happens, for Instance, when a Bottle of Hay, or such like Bodies fall upon the Head.

THE Commotion is frequently occasioned by a Fall, especially upon flat and even Bodies, which having no Unequalities, can make no Fractures; and then the Skull not being able to allay the Violence of the Blow, it must needs be communicated to the Brain; from whence follows the Commotion.

LASTLY, Mr. *Petit* says, it frequently happens by a Fall upon other Parts besides the Head, as when a Man falls from a very high Place upright upon his Feet: By such a Fall the Brain is very much shaken; which occasions a Commotion. Some have died of this Sort of Commotion; and the Surgeons have found an Abscess in their Brain.

THE diagnostick Signs of a Fracture are all equivocal, and may appear in other Diseases. For instance, a Piece of Linnen put between the Teeth of a Patient, to see whether he can hold it, is no Proof of a Fracture; for that Sign would at most discover the Fractures, that are under the *crotaphite* Muscle, and not those that affect the other Bones. Besides, the Difficulty of holding a Piece of Linnen might as well appear in the Contusions or Inflammations of the *Crotaphite*.

THAT same Cloth, which some Practitioners put between the Teeth of the Patient, and then pluck off with all their Might, that the Patient, feeling a Pain in that Part, wherein they suspect a Fracture, may lay his Hands upon it, and they may by that Means know where the Fracture lies, (in such Blows where there is neither Wound, nor Contusion, or a very small one) I say, such a Sign is still very equivocal, since it may happen in a Contusion of the Frontals and Occipitals alone, and in the Contusion and Inflammation of the *Periosteum*. Nay, I dare affirm that Sign is often fallacious, and that a Patient may feel
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a considerable Pain in the upper Part of the Parietal ; for instance, in consequence of a Contusion and Inflammation in the *Aponeurosis* of the Frontals and Occipitals, and in the *Periosteum* ; I say, the Patient will put his Hand there, as being a painful Part, when the Effusion and Fracture are in the lower Part of that same Bone, as I have already said.

THE Bleeding of the Nose is not a more certain Sign than the former ; it may be occasioned without a Blow, or by a Blow. In the first Case, it is usual in those Diseases, that proceed from Repletion, and then it happens three several Ways. 1. Because the Air, which continually passes through the Nose, thickens it. 2. Because its Blood-Vessels are very thin. 3. Because they lie upon a Membrane, which is itself stretched upon Bones ; and by the same Reason one may account for the Hemorrhages that happen after a Blow.

THE *Echymosis* and Blackness appearing about the Eyes, and as some say, the Blood that comes out of them sometimes, as well as out of the Ears, I say, those Accidents cannot be a true Sign of a Fracture : because they may happen in all the Obstructions of the Brain by the Communication of the Veins of the *Canthi*, and the *Præparatæ*, with the *Sinus* of the *Os frontis*, &c. So that according to that particular Structure, as often as there is an Obstruction inwardly, it will be communicated to the Outside, or from the Outside to the Inside.

As for Vomiting, we know that the Functions are impeded by a mere Wound of the *Pericranium*. Therefore, Vomiting is not a certain Sign of a Fracture.

THERE is no need of alledging many Reasons to shew that a Fever is not an undeniable Proof of a Fracture

Fracture, since it happens most times upon the least Inflammation, whatever Part it be in.

SINCE Matters of Fact confirm Reasonings, I shall insert here a History, which will give no small Weight to what I have just now advanced.

A Child having got by a Fall a small Contusion in the Fore-part of the Head, was affected with some of the Signs above-mention'd. His Surgeon blooded him four or five times, and perceiving that the Accidents continued still, notwithstanding those Evacuations, he propos'd the Trepan. Whereupon Mr. *Petit* was sent for, who having examined the Child, told the Surgeon, That all those Signs might proceed from another Cause than a Fracture; especially at a time when the Small-Pox prevailed, and consequently that the Trepan might be put off. He got the Child blooded twice more, and the Small-Pox appeared: The Accidents vanished, and the Child was cured of all his Diseases without being trepanned, which perhaps would have proved fatal to him.

THE Touch and the Sight are the most certain Signs of a Fracture: all the others are mere Conjectures, and may be found in a great many other Diseases. However, when they happen immediately after a Blow, and the following Circumstances are added to them, an univocal Consequence may be drawn from many equivocal Signs.

WHEN therefore a wounded Person has many of those Signs, which I have mention'd; three Circumstances ought to be minded. 1. The Instrument, with which the Patient was struck, its Figure, Matter, Lightness, or Heaviness. 2. The Person who gave the Blow, to know with what Degree of Force he gave it. 3. The Situation more or less

less advantageous, which the Enemy had over the wounded Person. A probable Conjecture may be drawn from those different Circumstances.

THE Signs, that discover a Crack or Slit in the Skull without a Wound, are a hard Pulse, a small flat Tumor upon the Blow, a kind of Fluctuation, and Hardness in the Circumference. But if there are many Slits cutting one another at different Angles, the Tumor will be more raised, because there is more Blood, but always with the same Circumstances: I mean a hard Pulse, a Fluctuation in the Middle of the Tumor, and a Hardness in its Circumference.

IF the Fracture is with Splinters across, that is, if there are Splinters, the Tumor will be large and flat, because the Blood is no longer supported by the Bones; and the Surgeon will feel a Piece of a Bone, which yields to the Impression of the Finger, and has some Elasticity.

IN order to know by the Touch, the Cracks and Slits of the Skull, when there is a Wound, the Surgeon ought to have a right Notion of the Situation of the Sutures, for fear he should mistake them for Fractures: and to that end, let him use a Probe, with a Button at the End of it.

IF the Wound lies in the upper and almost hinder Part of the Parietals near the *Sutura Sagittalis*, he must remember there is a Hole in each Parietal, and sometimes there is but one in one single Bone for both. Blood-vessels pass through those Holes, and go from the *dura Mater* to the *Pericranium*, and from the *Pericranium* to the *dura Mater*; and they are often found obliterated in adult Persons. I say, the Surgeon must remember not to mistake those Holes for a Fracture, least he should apply the Trepan to no purpose; which would always be prejudicial to the Patient.

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THERE is ground to believe that the internal Table is fractured, when the external is broke; but if the Surgeon perceives nothing at all in the external Table, and all the Accidents continue, he may suspect that the internal is fractured, if he has before examined the whole Head, to see whether he can find any Tumor, that discovers a Fracture in another Place.

IF a cutting Instrument makes a perpendicular or oblique Incision in the Skull, and that Incision reaches farther than the Angles of the Wound of the Teguments, 'tis a certain Sign of a Fracture; and to be sure of it, the Surgeon must speedily dilate the Wound; and he will see a Fracture in one, or both Angles of the Incision of the Skull. But if after the Dilatation of the Wound, he only perceives upon the Skull the Mark of the cutting Instrument, and if there are some Accidents, which inclose an Effusion, the Surgeon may be sure that there is a Fracture in the internal Table of the Bone.

WHEN a Ball makes a Wound in the Teguments, which penetrates to the Bone, it may be said that in such a Case there is generally a Fracture in the internal Table, on in the *Diploe*; and if such a Wound is never so little attended with some of the equivocal Signs above described, the Patient ought to be trepanned without any Hesitation.

IF after a great Fall, or a violent Blow, there is a Wound or a Contusion, attended with a Fracture, the Surgeon may be sure that the Violence of the Blow or Fall was lost in the Fracture. But if there is no Mark in the Bone, he ought to believe that the Disease lies elsewhere, as I have shewed by the Possibility of Counter-blows. In such a Case, the Surgeon must not only examine the Parts lying near the Wound,

Wound, but also, as Mr. *Arnaud* advises, the best Precaution, in doubtful Cases, is to shave the whole Head, in order to know what Condition it is in; and if a painful Tumor appears any where, it ought to be opened.

THE Signs of an Effusion are a considerable Redness of the Eyes and Face, with a Drowsiness; and those Accidents appear at the very same time that the Effusion happens. On the contrary, when they appear only afterwards, there is ground to believe they are a Sign of a Fracture in the *Pericranium*: which is further known by a great *Oedema* of the whole Head, excepting the Ears, as I have said, and by the Pain of the wounded Part. The Surgeon is still more certain that the *Pericranium* only is affected, when all the Accidents are over, after he has made an Opening.

THE Prognostick of Fractures is, that the most dangerous are those, that are not known; and according to this Doctrine, Contusions, capillary Slits, the Fractures of the internal Table only, and Commotions are very bad, and a Surgeon ought to be very wary in such Cases.

MR. *Petit* tells us, That a Soldier being shot with a Gun in the lower Part of the Coronal, towards the great Corner of the Eye, had a Wound, which seemed to be simple. He was dressed in the Hospital, and sometime after, the Patient being cured, resolv'd to go away, though the Major Surgeon advised him to stay longer. He was hardly come to the Gate of the Hospital, when he was seized with a Shivering, which forced him to come in again, and to go to Bed; and he died two Days after. His Body was opened: an Abscess appeared in the Brain; and the Ball that came in through the great Corner of the Eye, was found under

under the *Sella Turcica*, and under the Holes of the Optick Nerves.

I have seen a Girl of about eight or nine Years, who being at play, fell, and got a small Tumor in the Head. She was a little stunned for a while, and not long after she went again to her Play-fellows, her Parent not minding her Fall. A quarter of a Year after, she had a great Fever, a Redness in the Face, sparkling Eyes, Convulsions, a *Delirium*, and a light Head. Lastly, notwithstanding the Care of an able Physician she died; and they found an Abscess in her Brain. I think these Observations, far from being a Digression from my Subject, undeniably shew how carefully a Surgeon ought to mind those Wounds of the Head, the Importance of which is not easily known: They will make him apprehensive of some concealed Mischief, and even afford him, if he has any Genius, curative Indications, as far as they are possible.

IN general, when a Blow or Fall are violent, the Violence of either of them must needs be lost in the Disorder of the Skull or Brain. This Truth may be proved by a plain Comparison. If a Man holds a Board at one End with both Hands, and strikes violently the other End against a hard Body, and it splits, the Violence of the Blow being lost in the Split of the Board, will do no harm to the Person, who holds it. But if the Board, by its Solidity or otherwise, resists the Violence of the Blow, that Violence must needs lose itself somewhere else than in the Board, and cause a Commotion: This one may perceive by a Trembling and Numbness in the Hands, and all along the Arms.

THE Symptoms, which happen immediately, are less dangerous than those, which happen afterwards, because

Because the former are a Sign of a sudden Effusion, with which a Fracture is attended; and if a Surgeon is so lucky as to know that Effusion, he may hope for good Success: Whereas the latter discover to us an Illness, without enabling us to find the Place where it lies; and sometimes they appear only to give us Notice of approaching Death.

BESIDES those different prognostick Signs of Fractures in general, and of Commotions, we have others, that concern the Bones particularly, and are more or less dangerous, according as the Bones are more or less fractured, and according to their Solidity. For Instance, there is ground to believe that a Wound in the fore-part of the Head is sooner attended with a Fracture, than a Wound in the hinder-part, because the Bones of the first place are thinner than the others, and consequently more apt to break. But it may be said that the Fractures of the Occipital are more dangerous than those of the fore-part of the Head for several Reasons. 1. Because a greater Violence, and consequently a greater Commotion, was requisite to break that Bone. 2. Because it contains the *Cerebellum* and the *Medulla oblongata*, the Wounds whereof are mortal. 3. Because it comprehends, in its middle Part, the lateral *Sinus's* of the *dura Mater*, the Opening of which would be no less dangerous.

I shall shew by and by, that the Trepan cannot be applied upon the Sutures; from whence it follows that the Fractures in the Sutures are much more dangerous than those in the other Parts of the Skull.

FRACTURES that are multiplied, and cut one another at different Angles, are commonly less dangerous, when the Pieces do not change their Place, and do not destroy the Level of the Bone, than when they are depressed and jut out one upon another; because

cause in the latter, not only the Brain is very much compressed, but also the *dura Mater* is pricked with the Points of the Bones: Which occasions Inflammations, and frequently a Gangrene, not to mention the Effusion, which happens above and under that Membrane.

VIOLENT Blows or Falls, which must necessarily cause a Fracture, are more dangerous upon the Temporals, at the top of the Head, and in the *Fon-tanella* than any where else; because the Bones being very thin in those Places, are broken by such Bodies as would only make a Wound upon the Teguments of other Bones. Besides, the Temporals are covered with Muscles, and those Muscles themselves are covered with the *Pericranium*, and *Aponeurosis* of the Frontals and Occipitals. That Structure makes them very tender, and is often the reason why their Wounds are attended with very sad Accidents, which sometimes deceive those, who know not well the Disposition and Mechanism of those Parts.

IF the Parietals are very thin in their fore and upper Parts, and consequently apt to break by the least Violence, 'tis because they do not ossify in that Place till a long time after Birth. *Kerkering* says further he found them several times membranous in adult Persons. This Observation is of no small Importance; for a Surgeon might be mistaken in the Wounds of the Head; and when he touches a Contusion or a mere Wound of that Part, and feels the Motion of the Brain, he might think the Skull is broke. But to avoid that Mistake, a Surgeon must in such a Case ask the Patient and his Relations, whether it be a natural Thing, which they perceived before the Patient received the Blow, or got a Fall. Such a Caution ought to be used,

used, for fear of making a bad Prognostick, which perhaps would move the Surgeon to perform an Operation more dangerous than the Illness it self.

THE Fractures penetrating into the *Sinus* of the Eye-brows, are also dangerous, not only because the Trepan cannot be applied upon them, but, because the Cure is very difficult, by reason of the serous Humor, which runs continually, and may make them fistulous.

To make an end of the Prognosticks of the Fractures of the Skull, and Commotions of the Brain, the Surgeon must add to all I have said, the equivocal Signs, that appear in them, such as Drowsiness, a Fever, the Blackness of the Eyes, &c. the Age, Temper, and Strength of the Patient. He must examine whether those Signs appeared with the Blow, or the Fall, or some time after; and from all those Observations a right Prognostick may be drawn, which will frequently prove useful to the Patient, and advantageous to the Surgeon.



CHAP. XL.

Of the Operation of the Trepan.

SINCE the Commotion is a Disease occasioned by a Blow, a Fall, or a Shaking, which disorders the Brain to such a degree, that it is attended with Symptoms not unlike those of the Fractures of the Skull, and of the Effusion upon the *dura Mater*; and since we don't know in what Part lies the Illness, which occasions the sad Symptoms and Abscesses attending that Disease, as I have proved by the fore-

going Observations; it follows that in such a Case Surgery is of no great use, and that a speedy and frequent Phlebotomy is the only Help it can afford.

I saw a Man at the *Hotel-dieu*, who fell into a Quarry. All the Parts of his Head were examined, and no Wound, nor even a Contusion could be found; but because he lost his Senses, it was plain the Brain had suffered a violent Commotion. He was blooded several times in the Arms, and in the Feet, and jugular Veins, and then the Physicians prescribed the Emetick.

ON the fourth or fifth Day, his great Drowsiness turned into a *Delirium*, and such a Fury, that it was thought necessary to tie his Arms and Legs at the four Corners of his Bed. Within a Fortnight he grew so quiet and weak, that he could hardly stand. At last, he was cured with good Food given him to recover his Strength; and during his Sickness they gave him Broth with an open Spoon.

A Surgeon, who designs to perform the Operation of the Trepan prudently and cautiously, must have three essential Circumstances in view. The first consists in uncovering the Bone; the second in the Manner of piercing it; and the third in taking off extraneous Bodies.

AMONG the different Fractures above-mentioned, some are attended with a Wound in the hairy Scalp, and others are without a Wound.

To discover a Fracture of the Skull, attended with a Wound in the hairy Scalp, the Incisions that are made in it, ought to be so directed as to pass through the Angles of the Wound, if it be possible, to avoid causing a Deformity, and not to destroy the Skin without necessity.

IF the Fracture of the Skull is not attended with a Wound in the Teguments, but only with a Contusion, the Incision ought not to be made immediately. But the Surgeon must handle with his Fingers the whole Contusion, that he may be sure of the Solidity, or Brittleness of the broken Bone; and if there is a great Rupture, and many Splinters, as it were, floating, if I may use that Expression, (which may be known by applying the two Forefingers upon the Wound, or Contusion, and pressing alternately first upon one Place, and then upon t'other) then the Surgeon may perceive that the Pieces yield, and have an Elasticity. In such a Case, it would be dangerous, to drive the Instrument as far as the Bone, and to cut at once the Skin, the Muscles, and the *Pericranium*; for by conveying too hastily the Instrument upon the Pieces of Bones, that are not very solid, one might be apt to depress them upon the *dura Mater*, to prick that Membrane, and to occasion great Disorders. On the contrary, that Opening ought to be made in such a Case, by dissecting, and that very gently. Nay, Mr. *Arnaud* says, there is generally in such Cases a Vacuity between the *Pericranium* and the Pieces of Bones; and when the Surgeon comes to it, he is to put his Finger in, or a grooved Probe, and to make an end of the Incision upon that Instrument.

ALL Authors describe exactly, and, almost with one accord, the different Figures of Incisions. I never heard able Surgeons make those Differences in their publick or private Lectures; and I have seen great Practitioners, who frequently performed that Operation, make generally the crucial Incision, even upon the Sutures, and the crotaphite

Muscle, without any Accident arising from it. But because the Fibers of the crotaphite, frontal, and occipital Muscles ought to be used tenderly, as much as the Bigness of the Fracture allows of it, the Surgeon makes a longitudinal Incision according to the Rectitude of their Fibers; and that it may the better uncover the Bone in the fractured Part, he makes it longer; and if that Incision is sufficient to apply the Trepan, the Wound is sooner cured, and with less Deformity. But if the Fracture is so considerable, that the longitudinal Incision cannot uncover the Bone, it ought to be made cross-wise. This Mr. *Arnaud* has practiced with good Success upon the crotaphite Muscle, whose very Substance he has cut away; without mentioning the Examples I have already alledged.

THERE is still another important Observation to be made with respect to the Incisions necessary to discover a Fracture. It consists in cutting as much of the *Pericranium* as of the Skin, and even more, to avoid the drawing of the former, and the Bridelings it would form in the Angles of the Wound, which would quickly be attended with an Inflammation, and other sad Accidents.

To make the Incision well, I suppose a Contusion upon the middle Part of the Parietal, attended with a Fracture, and consequently with an Effusion upon the *dura Mater*, or the Brain, and the fractured Pieces to be strong enough to sustain the Impression of the cutting Instrument, without depressing, or pricking the *dura Mater*. The Incision is made in the following Manner.

THE Surgeon takes a strait, or crooked *Bistouri*, upon the Back of which he lays the Fore-finger of his right Hand. He bears with the Thumb of his left

Hand

Hand upon that Part of the Skin where he designs to begin the Incision, and drives the Point of the Instrument, as it were under the Thumb, to the Bone, to cut more of the *Pericranium* than of the Skin. Afterwards, he continues that first Incision all along, without raising the Instrument; and because at last the Skin is more cut than the *Pericranium*, especially if he has used a strait *Bistouri* somewhat inclined, he shifts the Instrument into the other Hand, and lays the Thumb of the right Hand upon the Extremity of the Incision, to make an end of cutting the *Pericranium* in the same manner as he began.

IF that Incision is sufficient to discover the Fracture, and to fix the Trepan, the Surgeon does not extend it farther, but when the Disease is more considerable, he makes a second Incision, which cuts the first in the middle. He uses the same Caution in this second Incision as in the first, only with this Difference, that it ought to be interrupted, and made at two several Times: I mean, that when the Point of the Instrument comes to the middle of the first Incision, the Surgeon must remove the Instrument into the other Hand, and apply the Thumb of his right Hand upon that Part of the Skin, which he designs to cut, to make the second Arm of the Cross, as I have already said, and stop in the middle of the first Incision.

THE Design of that shifting of Hands is not to shew the Surgeon is *Ambidexter*, but to cut the *Pericranium* parallel to the Skin; for if the second Incision was continued without any Interruption, as the first, the Skin being no longer supported, by reason of the first a Division, would yield, and the Incision would not be regular.

THE Surgeon, in the Operation of these Incisions, must cut the *Pericranium* as exactly as he can ; and with his Thumbs or Fingers he is to loosen it from the Bones, together with the Angles of the Wound ; which is easy enough, when it is well cut. He must also examine, without going farther, whether it makes no Bridelings, and he must cut them ; for they frequently occasion some Accidents, which deceive the Surgeon. If some Fibers of the *Pericranium* are so adherent that they cannot be separated with the Fingers, they must be loosened with a Fleam.

WHEN the Muscles, that cover the Skull, are cut transversely, or obliquely, with a Sabre, or any other cutting Instrument, the Skin shrinks inwardly ; so that it appears afterwards, that the Hair of one of the Lips gets into the other ; which occasions an Itching troublesome to the Patient, and the Scar is never well made : Nay, that Hair cannot be shaved, because it is too deep, and frequently engaged in the opposite Lip. To remove that small Accident, the Surgeon must thrust the *Bistouri* into the Middle of the Lip of the Wound, by which means there will be two Angles in it, which will unite, without folding thus upon one another.

THE Surgeon having discovered the Fracture, with the help of those Incisions, and examined its Extent, must fix upon the Time of the Operation. Authors put it off till the next Day after the Incision, that is, four and twenty Hours after having discover'd the Fracture. But that Time should not be so remote, since the sooner that Operation is performed, the more successful it is ; and if the Fracture gives occasion to suspect that the *dura Mater* is pricked by the Points of the Bones, the Surgeon must immediately perform the Operation, and free the Membranes, as soon

soon as possible, from the Bodies that molest it. By that means one may prevent some Accidents, which frequently occasion the Death of the wounded Person.

I believe, the Hemorrhage was the only Reason that moved Surgeons to put off the Operation till the next Day ; but if the Compression be used, three or four Hours are sufficient to stop the Hemorrhage ; and if some large Vessels emit Blood, they must be tied ; and this last Precaution ought to be used, when the Operation is performed immediately, and there is a considerable Loss of Blood.

IF the Operation be put off three or four Hours after having uncovered the Bone, and the Compression be used to stop the Hemorrhage, the Patient must be dressed : and because the Surgeon designs to stop the Blood, he must fill the Wound well with large Tents, to stop the small Vessels, and he must raise the Dozels like a Pyramid, to keep the Angles of the Wound half reversed ; and at every Dressing he ought to depress them by degrees, to forward the Cure, and prevent Deformity. But if the Disorder of the fractured Pieces is considerable, and some Pieces of Bones have a Motion, the Surgeons are to take care not to put any Dozels upon those Pieces, and to contrive the Matter so, that all the Lint may not exceed the Level of the Wound ; for to make a propping Point would depress the Piece. Ligatures would be of great use upon this Occasion, since the Compression can hardly take place, and the Surgeon might lay, upon each Ligature, a small Compress, and the rest, as I shall say hereafter.

WHEN it is thought proper to take off the Dressing, in order to put in execution the second essential Circumstance for the Operation of the Trepan ; care ought to be taken to remove the Compresses and

Plaister, if they have been used, by the four Corners, in order to bring the Lips nearer to the Center of the Wound, and the middle Part of that Dressing must be taken off last. The same Observation ought to be made in relation to the Dozels, with which the Wound had been filled : those that have been laid upon the Arteries, or the small Compresses, must be taken off last, without pulling them, for fear of opening the Vessel, and occasioning a new Hemorrhage.

WHEN the Bone is wholly uncovered, when the Hemorrhage hinders the Surgeon no longer from seeing what Condition it is in, and he can examine the Nature and Place of the Fracture, he proceeds to the Operation of the Trepan. But before I describe the Method of performing that Operation, I think it will not be improper to take notice of those Parts, upon which that Instrument ought to be applied.

IN general, the Surgeon is not to trepan the Sutures, because he would tear the Strings of the *dura Mater*, which adhere very much to them. Besides, he might tear the Vessels, which pass from that Membrane to the *Pericranium*, and from the *Pericranium* to that Membrane. The Surgeon must not fix the Trepan upon the Middle of the Coronal, because he would open the upper longitudinal *Sinus* of the *dura Mater*, which runs all along a Furrow formed in the internal Part of that Bone ; and it would occasion an Hemorrhage, which could not be stopped without great Difficulty. This Precaution is chiefly used in the middle, and the lower Part of the Forehead, by reason of the Spine of the Coronal, which adheres to the *dura Mater* ; for the Trepan would tear that Membrane, and open some Arteries on the Sides, while it saws that kind of Crest ; so that

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the same Caution ought to be used in those Parts as in the Sutures.

HOWEVER, if there was a Fracture crossing the Middle of those Bones, or the Sutures, the Trepan should be fixed upon the Side of the Suture; and if the Accidents remained two Days after, the same Operation should be performed on the other Side of the Suture and Fracture.

THE Surgeon must not trepan, without great necessity, upon the *Sinus* of the Eye-brows, for he thinks he is upon the Brain, when he is only in the *Sinus*'s, as we know by some Instances. The Operator may easily undeceive himself by means of the Probe, and by dropping some bitter and odoriferous Liquor into the Hole; for it is immediately smelt in the Nose. Besides, the Openings of those *Sinus*'s remain generally fistulous, and the Air comes through upon breathing somewhat strongly, which is confirmed by an Observation of Mr. *Duverney*: That Surgeon says, he saw a Man, who having been struck by a Splinter of his Gun upon one of the superciliar *Sinus*'s, clapt his Hand upon his Plaister every time he wiped his Nose; otherwise the Plaister would have come off.

THE Surgeon must not trepan, neither upon the Middle of the Occipital, especially towards the lower Part of it, for the same Reasons as he ought not to trepan upon the Coronal; nor upon the lateral *Sinus*'s, which are commonly situated under the transverse Eminence of the lower and middle Part of that Bone, because he might open them, and Death would ensue.

LASTLY, the Surgeon is not to trepan upon those Pieces of Bones, that have a Motion, and which appearing loose, have not the Solidity which that Operation requires.

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IF there is any Piece of Bone in multiplied Fractures, that cut one another in their Angles, the Surgeon must endeavour to take it off; and when the Piece is removed, if the Opening be large enough to let out the diffused Blood, and other Matters, there is no need of any other Trepan besides that which Chance has made. This I have seen in a Man, who being struck with a Last by a Shoemaker, was carried to the *Hotel-dieu*, the 8th of *October* 1713. Mr. *Mery* found a small Wound, in appearance, upon the middle Part of the right Parietal; but it appeared, by the Probe, that there was a considerable Fracture. That Surgeon made a crucial Incision, having laid bare all the wounded Part, he took off a Splinter, which was only the first Table of the Bone. The next Day he took off two other Splinters; and the *dura Mater* all black and gangrened came out with them. Mr. *Mery* put upon the Brain a *Sindon* dipt in warm Spirit of Wine, and over it small Dozels dipt in the same Liquor, some Plagets covered with a digestive, &c. The Patient was dressed much in the same manner, all the Time of his Illness, and perfectly cured the 26th of *December* in the same Year, contrary to Mr. *Mery's* Expectation.

BUT when there is no Hold to take off the Splinters, or the natural Opening is not large enough to let out the extravasated Blood, the Surgeon is obliged to fix the Trepan upon a solid Part of the Bone, and as near the Fracture as he can, in order to take out the Pieces with the help of the Elevatory, as I shall say hereafter.

THE second essential Circumstance of the Trepan, is, as I have already said, the Manner of piercing the Bone; but because that Operation lays open the Substance of the Brain, exposes it to the Impression of
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the Air, and is attended with Difficulties, some Precautions ought to be used to remove those Obstacles.

FIRST, the Surgeon must order the Patient to be set in a Place, as free from Noise and ill Smells as possible. The Air is to be purified, by keeping the Doors and Windows shut, and a good Fire in the Place, with a Chafing-dish upon the Patient's Bed, and some Fire in it, during the Operation. Afterwards, the Patient must be placed so as the Surgeon and Servants, may stand round him conveniently, his Head must be kept steady during the Operation; and in such a Situation that the Fracture may lie in the highest Place, that the Trepan may fall perpendicularly upon the Part where it is.

ALL this may be done, by removing the Bed from the Wall, that every Body may go round it, by putting a Pewter-dish under the Patient's Pillow, to keep him from sinking and stirring, and by getting some Servants to hold his Head.

CARE ought to be taken to put the Dressing in a Dish laid upon a Table, till the Operation be over; and a Candle must be lighted near that Dish, that one may quickly light again the Wax-Candle, which gives Light to the Surgeon, if it should go out. The proper Instruments must be laid in order, upon another Dish or Bason, first covered with a folded Napkin; and then they shall be put upon the Bed.

WHICH being done, the Surgeon shall take the Arbor of the Trepan, mounted with the Coronet that shall best fit it, with its Pyramid, and holding, with his right Hand, all those Instruments joined together, by the Basis of the Coronet, like a writing Pen, he shall convey them somewhat inclined upon
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the Part he has a mind to pierce ; and raising the Trepan gently, that it may fall perpendicularly upon the Part to be trepanned, he shall take care that the Teeth of the Trepan pass a little over the Fracture, provided the Pieces be solid ; and he shall turn the Trepan two or three times, to make the Impression of the Pyramid upon the Skull.

IF the Surgeon has a mind to use the *Perforative* Trepan, this is the time for removing the Coronet, and for substituting the other in the Mark engraved by the Pyramid upon the Skull, and by turning the Arbor of the Trepan from the Right to the Left, as I shall say hereafter, the Surgeon makes room for the Pyramid : But when he has a good Coronet, and a good Pyramid, he need not use the *Perforative*. The Pyramid must be steady in the Coronet, and not exceed it in Length above a Line, because there would be some Danger of piercing the *dura Mater* in a thin Skull.

WHEN the Operator saws the Skull, he lays the Palm of his left Hand upon the Handle of the Trepan, resting it upon the Forehead, not so much to bear upon the Arbor, as to make the Coronet steady, and that his Sight may fall perpendicularly upon its Circumference. Afterwards, he claps his right Hand upon the small Ball, which is in the Middle of the Arbor, to turn it from the Right to his Left, in order to saw the Piece of Bone. Which happens two several ways ; for by pressing gently with the left Hand upon the upper Handle of the Arbor of the Trepan, the small Teeth of the Coronet cut the Bones perpendicularly ; and by turning with his right Hand the Ball of the Middle of the Arbor, the Edges of the Teeth of the Coronet cut the Bone horizontally.

THE Operator may go fast enough, when he begins to saw, because there is nothing to fear; taking care however not to lean too hard with his left Hand upon the Arbor of the Trepan, lest the small Teeth of the Coronet should sink into the Skull, which would hinder him from turning uniformly with his right Hand; and when he perceives that Inconvenience, he must move his right Hand half way round from the Left to the Right, and then go on again gently. He must also incline a little the Arbor of the Trepan on all Sides, to make more room for the Coronet, and more on one Side than on the other, when he perceives the Circumference of the Bone is not cut equally on all Sides. This he easily knows, when there appears more Saw-dust on one Side than on the other; and the Instrument must be inclined on that Side where there is least.

WHEN the Coronet has sufficiently cleared its way, the Operator removes the Trepan, turning the Coronet half way round from the Left to the Right, and then sets his right Hand upon the Basis of the Coronet, and takes it off in that manner to remove the Pyramid, with the help of the Key. Afterwards he takes care to sweep away, with a small Brush, the Dust that lies upon the Skull, to remove that which is in the Mark of the Coronet with a small Tooth-picker, and to clean the Coronet with the same Brush. He applies the Trepan again, holding it, as I have already said, like a writing Pen, and inclined, that it may enter at once into the Opening, which he has begun to make in the Skull; and he raises it gently to resume its first Situation, in order to go on with the Operation. But he must remember that the Pyramid has been removed, and consequently that he must turn more gently, for fear of going wrong way.

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As often as he perceives any Resistance in the Coronet when he turns the Arbor of the Trepan, 'tis a Sign the small Teeth of the Coronet sink too deep. He must then turn half way round from the Left to the Right and begin again, but a little more gently.

If the Operator has a mind to use the Tirefond in order to remove the Piece of Bone, I think it more proper to mark out the Circumference of it before he comes to the *Diploe*, because by making a Screw in the Piece of Bone with that Instrument, he gives a circular Turn, which would be strong enough to divide the first Table from the second, if the *Diploe* was sawed; and though that Fault be not in the main prejudicial to the Patient, yet it makes the Operation more difficult and longer.

THE Operator applies the Coronet again, and continues to saw, till he comes to the *Diploe*. Surgeons skill'd in those Operations are soon sensible of it, because the Bone is not so hard to cut, and they feel a small cracking Noise in that Hand, which holds the Trepan. Besides, the Dust gathering about the Coronet grows a little redder than that of the external Table of the Bone.

WHEN the Operator is come to the *Diploe*, he must go on more gently, raise the Trepan frequently, in the manner above-mention'd, sweep the Saw-dust which the Teeth of the Coronet separate from the Bone, and put the small Tooth-picker into the Hole of the Coronet, not only to take out the Dust, but also to know the Depth of the Opening: and therefore that Tooth-picker ought not to be sharp-pointed, because when the Operator comes near the *dura Mater*, the Skull not being equally thick every where, he might thrust it into those Parts that were first sawed.

It will not be amiss to have two Coronets of the same

same size, that if one should happen to fail, the Surgeon might make an end of the Operation with the other; and if those Coronets want a little Oil to make them cut better, he may put in some to facilitate the Operation.

THE Operator shall frequently endeavour to shake the Piece with a small silver or steel Lever, one end of which must be like a Chisel, very narrow, pretty thin, and somewhat rounded; and the other crooked, for the Conveniency of many Operations. He is to continue to saw gently, taking care, as I have already said, to incline the Coronet on that Side where the Bone does not appear to be cut equally: which commonly happens upon the Parietals, by reason of the Convexity of those Bones. The Piece must not be sawed too much; for one might not only tear the *dura Mater*, but also open some Arteries creeping upon that Membrane, and lodged in the Scissures engraved in the internal Part of the Bones of the Skull, as there are some pretty deep in the Parietals, especially in their lower Parts: however, the Surgeon must leave as few Inequalities as he can.

HE endeavours again to shake the Piece of Bone with the small Lever above described, for which we are indebted to Mr. *Petit*; and if he perceives that it does not stick much, he pulls it off. Lastly, he examines that Piece, and if he perceives some Inequalities in it, 'tis a Sign the Trepanning is rightly made.

THE third essential Circumstance consists in removing extraneous Bodies: Those that appear first, are the Inequalities which the Coronet leaves in the Circumference of the Hole. Before the Surgeon takes them off, he must press a little upon the *dura Mater* with the *Meningophylax*, to open a Way for the lenticular Knife. But that Operation ought not to be performed.

performed, before the Surgeon has heated the buttoned End of that Instrument in the Palm of his Hand: The same ought to be observed with respect to the lenticular Knife; for nothing cold must be applied upon the *dura Mater*, or the Brain.

To take off the Inequalities, which the Coronet has left in the Circumference of the Hole, the Surgeon uses the lenticular Knife, with which he cuts, at several times, those small Points of Bones, that might prick the *dura Mater*. He holds that Instrument fast with the four Fingers of his right Hand shut; and Mr. *Arnaud* says, that if there is no Fracture, one may lean with the Thumb upon the Bone, to have more Strength. But if the Fracture reaches to the Circumference of the Opening of the Skull, Mr. *Petit* advises us to use the Thumb of the left Hand, in order to raise the Thumb of the right Hand, and to serve it instead of a propping Point.

WHEN the Inequalities, which the Coronet had left, are taken off, one must let out the Blood diffused upon the *dura Mater*. That Blood is frequently of two sorts. The first, which appears sometimes after the removal of the Piece of Bone, is of a fine lively Red, and fluid. There is ground to believe that such a good Blood is not that which occasions the Accidents, and that it proceeds from the *Diploe*, which has been cut. But when the Surgeon sees under the first Effusion, a blackish, thick, and clotred Blood, and a small Part of it adhering to the *dura Mater*, there is ground to think that this is the Blood that was diffused by the Fracture, and that Trepanning must needs be very beneficial.

To let out that Blood, or the *Pus*, if there is any, the Patient must shut his Mouth, and make a strong
Inspiration;

Inspiration ; and immediately let some Body squeeze his Nose, that he may make a great Expiration. The Surgeon will then see the Hole of the Trepan full of Blood, which he must suck up with a small Piece of fine Sponge, first dipt in warm Wine, and well squeezed. Afterwards, let the Patient breath a little to repeat the same thing ; and whilst he endeavours to make a great Expiration, the Surgeon shall press a little the *dura Mater* with the *Meningophylax*, which he shall hold with one Hand, whilst he conveys with the other the Piece of Sponge, that it may be imbibed with Blood.

IF the Brain distends itself, when the Patient makes a great Expiration, after the shutting of his Mouth and the squeezing of his Nose, 'tis because in that Action the Diaphragm happens to be in such a violent Contraction, that its two Tendons come very near one another, by which means the lower *Aorta*, which runs between them, must needs be very much compressed, and consequently Part of the Blood will not descend to the lower Parts. That Blood will therefore run back, or force that which comes behind to get into the Arteries, that go to the Head from the Bending of the *Aorta*. Thus the Brain will be overstocked with Blood, and consequently dilated in that Expiration.

THIS Argument is supported by an obvious Effect ; for the Patient's Face grows extremely red at the Time of the forced Expiration, which cannot be explained but by the Blood's running too plentifully into it.

THE *Dura Mater* must lie open to the Air as little as possible, because the Impression of that fluid is very prejudicial, and brings upon it an Inflammation attended with sad Accidents.

THERE is a third sort of extraneous Bodies, that

are to be removed, *viz.* the Splinters of Bones, which may sometimes prick the *dura Mater*, and the loose Pieces occasioned by a great Fracture, and by many Slits cutting one another at different Angles. If those Pieces of Bones lie separate, they must be taken off with Pincers that have Rings, because the Surgeon has a better Hold with them. But he must remove them gently, especially when there may be supposed to be Points engaged in the *dura Mater*; for if he should pull them hard, he might open a *Sinus*, which is a Mischance he could not easily remedy. In such a Case, he must rather apply a second Coronet of the Trepan, always in a solid Part, to let out the extravasated Blood, and take off the Piece of Bone more easily with the Elevatory.

It happens in some Fractures, that a Splinter of Bone gets in between the *dura Mater* and the Skull. The Surgeon then is obliged to apply two, three, or more Coronets, that he may be able to take off the Splinter, which compresses the *dura Mater*; and he cuts by degrees with incisive Forceps the Angles too acute, that remain in the interval of the Coronets.

THE Coronets are multiplied according to the Fractures. In those Slits that are long, the Operator applies two Coronets at the Ends, one on one Side, and th'other on th'other Side, taking care that they alwas pass over the Fracture. In the Slits betwixt two Bones he applies one likewise to each Bone. Lastly, if he has a Mind to separate the Partition or Interval of the two Coronets, he saws the Piece of Bone on each Side as far as the *Diploe*, or a little beyond it, with a small Saw, convex on one Side, and straight on the other: Afterwards he takes off the Piece with the Elevatory. If he suspects that the

Partition

Partition is not solid, he makes it fast with the Elevatory to saw it.

WHEN the *Diploe* is vitiated, and there is a Contusion in it, the same Accidents appear as in the Fracture of the two Tables ; and Trepanning is the only Remedy. But if nothing comes out through the Hole, when it is taken off, and the Accidents cease, 'tis plain the *Diploe* was the only affected Part.

IF the Operator thinks it is absolutely necessary to apply the Coronet of a Trepan upon a Piece of Bone which does not appear very solid, he raises it with an Elevatory, taking care not to use the opposite Bone as a fixt Point, for if it was tender, it would be crushed ; and if it made no Resistance it would sink upon the *dura Mater*.

WHEN the Surgeon has sufficiently opened the Part, with the help of the Coronets, if he thinks fit to raise some Pieces that are sunk, he uses proper Elevatories ; for there are several sorts of them according to the different Fractures. He holds that Lever with the right Hand, and passes it under the Piece of Bone he has a mind to raise, taking care, as I have just now said, not to rest it upon the opposite Bone ; and during that time, he bears with the Thumb of his left Hand upon the Piece, which he raises, to support it on all Sides.

Now the Patient must be dressed. The first Piece of the Dressing is the *Sindon*, which is a small Piece of Linnen cut round, or some Lint tied in the Middle with a Thread. But the former is preferable, because the Threads of Lint are apt to scatter. That *Sindon* must exceed the Circumference of the Hole, at least by one Line, not only that it may better stick where

it should, but also because being engaged under the Circumference of the Hole of the Trepan, it blunts the Edges of it, which might prick the *dura Mater* in the Motions of the Brain.

MR. *Arnaud* says, 'tis better to apply a dry *Sindon* than dipt in any Medicament, because it can more easily be adapted upon the *dura Mater* than when it is wet. The *Meningophylax* or lenticular Button ought not to be used, (as is generally practiced) to apply the *Sindon*, and pass its Circumference between the Skull and the *dura Mater*, because one cannot see whether the Thread that ties it be in the Middle: It is better to use the crooked End of Mr. *Petit's* small Lever. Afterwards the Surgeon pours some Drops of a proper Medicament upon the *Sindon*; and the best that can be applied upon the *dura Mater*, is the white Balsam of *Fioraventi* a little warm. In the next place the Surgeon shall lay upon that *Sindon* small round Plagets of the Bigness of the Hole, and dipt in the same Balsam: He must lay two or three, according to their Thickness; for the Hole of the Trepan ought to be filled with them, to compress the *dura Mater* gently, in order to keep it from moving out of its Sphere, and to prevent by that means the *Hernias* of that Membrane and of the Brain, which are generally mortal: Wherefore the Surgeon must always keep his Finger upon that Part, when he dresses those sorts of Wounds, and remove it only to put in new Pieces of the Dressing. Above those small Plagets he lays two other larger, and dipt in the same Medicament. Lastly, the remaining Part of the Wound must be dressed, I mean, with Plagets covered with a digestive Ointment, for there is no need of filling up the Wound but when the Operator has made the necessary Incisions to dis-

cover

cover the Fracture; and in the next Dressings, the Dozels must be laid aside, and care ought to be taken to bring the Lips of the Wound as near together as possible. That whole Dressing is covered with Compresses dipt in warm Spirit of Wine and Oil of Roses, without using any Plaisters, which stop the Pores of the Skin, and retain the Suppuration within the Wound. The Whole is supported by a *Couvrechef*.

Of the great Couvrechef, or the square Couvrechef.

To make this Bandage, the Surgeon takes a Napkin longer than it is broad: he folds it transversely in such a manner that one of the Ends comes over the other about two or three Fingers Breadth. Then he folds it double again, taking care that the longer End be inwards, and the other outwards. This last Fold being only to mark the middle of the Napkin, it must be made more visible, by pressing it a little with the fore-Finger and Thumb of the left Hand. Afterwards it is usual to put the Fingers of each Hand within the Napkin, on both Sides of the Fold, and to clap the Thumbs upon the Out-side, in order to convey the Napkin thus, with both Hands, upon the Patient's Head. But that Method is not elegant, and may sometimes be prejudicial; for the Surgeon being obliged to make half a Turn, in order to lay the stretched Napkin upon the Patient's Head, his Sleeves may hurt him. The Surgeon must therefore make that Bandage more elegantly, and avoid that Fault, by holding the Napkin only with one Hand, (the Fingers within, and the Thumb without, as I have just now said) conveying it upon the Patient's Head behind his Back, and raising it there with both Hands, for fear of disordering the Dressing.

Afterwards, he must let the Napkin fall gently upon the Dressing, taking care that the Fold be at the Root of the Nose, or somewhat lower.

The four Angles of the Napkin, according to that Situation, hang down upon the *Clavicula*. Then the Surgeon bids a Servant, or the Patient, hold the two external Angles under the Chin, whilst he takes the internal Angle of each Side over-against the Chin, taking care that the four Fingers be outwards, and the Thumb inwards. He removes those Heads on both Sides of the Chin, and then raising his Hands a little, he turns back by that Motion the Fold of the Napkin, which comes as far as the Nose; and conveying the Heads towards the Nape, he forms several Folds near the small Angle of the Eyes. When the Heads are at the Nape, the Surgeon unpleats the Napkin with his Fingers, that the Bandage may be neater, and the Patient not troubled with a Heap of Linnen. Afterwards, the Surgeon crosses the Heads upon one another, and ties them with a Pin as low as he can.

AFTERWARDS the Surgeon must come before the Patient, and take, with one of his Hands, the external Heads, held by a Servant or the Patient: and then he must convey the four Fingers between the Cheek and the internal Head, and the Thumb into the Doubling of that same Head, where there is a great Cavity called *Sinus* by the Antients. There the Surgeon must draw the Head directly downwards, to level many Pleats, and make the Bandage more even, and then he must draw the Head backwards to disincumber the Cheek. The Surgeon does the same on the other Side, taking care to hold with the other Hand the Heads that are under the Chin. Now these Heads must be made fast, and if they are short, they must

must be pinned under the Chin ; but if long, they must be tied. That Knot is little regarded ; and yet when made very neatly, it is easy to the Patient, and very much sets off the Bandage. To have it according to my Fancy, it should be double ; but whilst it is yet single, the Surgeon is to draw the upper Head under the middle of the Chin, and set it a little on one Side. Afterwards, that Head is twisted round the lower one, to make the second Knot ; and thus one may have a Knot neatly made.

THE two Sides of the middle of the Napkin remain still, and hang down upon the Back and Shoulders, like a kind of Bishop's Camail. If they are short some Surgeons fold them double, and put them round the Neck to tie under the Chin. If they are long, those Surgeons are for lifting them up ; but to do it neatly, the Surgeon must stand by the Patient's Side, and remove all the Folds that are in that Side of the Napkin, which hangs down upon the Shoulder, and then fold that same Side in its Forepart according to its whole Length, and about three or four Inches in Diameter, to convey it towards the middle and upper Part of the Coronal, where he ties it with a Pin. The Surgeon does the same thing on the other Side of the Patient ; which produces behind the Head a long Point like the Hood of some Monks : it must be pulled sideways to pin it in both Sides.

THE Camail being thus raised and fitted, forms a kind of Cap over the *Couvrechef*, which keeps the Head warm ; and that whole Bandage is very neat, and supports the Dressing very well.

WHEN two or three Coronets have been applied near one another, the Surgeon must lay a *Sindon*,

according to the Hole, in the Skull, and over that *Sindon* small Compresses one upon another, to resist the Motion of the Brain. Which is the Reason why Mr. *Belloste* has contrived a leaden Plate with two Handles, that are laid upon the external Part of the Skull, as one may see in his Book. But it is of no great Use, since it is only supported by the Dressing which is above it, and the Impulsion of the Brain may remove it from its Place. And therefore Mr. *Petit* has invented one of a quite different Structure. To fit it to the Bigness of the Hole he lays, in dressing the Wound, a Paper upon the Bone, which adapts itself exactly to the Figure of the Hole. Afterwards he cuts the Paper, which serves as a Model to cut the leaden Plate. He ties it in the Middle with a Thread, and lays it upon the *Sindon*. He fastens that Plate with a small transverse leaden Lamina, a little longer than the Plate, which rests under the Bone. The leaden Plate must also be tied with a Thread. Afterwards the Surgeon dresses the Wound, in the manner I have said.

THE Trepan must be dressed twice a Day, if the Suppuration be copious, especially when there is a considerable Effusion. Care ought to be taken to make the Patient inspire and expire so as to let out the *Pus*. The Chamber must be kept shut and warm, especially in cold Weather. Whenever the Wound is to be dressed, there ought to be a Chafing-dish hard by, and the Bed-curtains must be drawn.

THE Patient must in general be kept to a very regular Course of Diet: he should be frequently blooded the first Days, tho' still in proportion to his Strength and the Violence of the Accidents. For if the *dura Mater* was inflamed, the Fever violent, &c. Phlebotomy should accordingly be more frequent.

Clysters

Clysters are also of great Use, and have a good Effect by relaxing the Belly.

C H A P. XLI.

Of the Aneurism.

HAVING described, as exactly as I could, the Operations commonly practiced in the three Cavities of the Trunk, and their Circumference, the Order I have prescribed to myself, requires that I should now discourse of the Operations that are proper for the Extremities. I shall begin by the Cure of the *Aneurism*.

WE mean by that Word a Tumor, consisting of arterial Blood, occasioned by the Dilatation of some Artery, or an Effusion of Part of the Blood contained in it, attended with a Pulsation more or less sensible, according to its Extent or its Differences: And by reason of that Diversity, Authors have assign'd two sorts of *Aneurisms*. The first, which they call true, is a Tumor made by the Dilatation of an Artery, and always attended with a Pulsation, which lessens, as the Tumor grows bigger. The second, called a *spurious Aneurism*, is a Tumor made by an Effusion of the arterial Blood, occasioned by the opening of an Artery, and which is not attended with an interrupted and distinct Pulsation, but with a kind of hollow Noise, or rather a Whizzing, which encreases as the Tumor grows bigger, and more arterial Blood is diffused into it.

THOSE two sorts of *Aneurism* proceed from internal and external Causes. The true *Aneurism* is commonly

monly occasioned by great Agitations, and violent Motions in those Parts where the Muscles exert themselves most. It proceeds also from Compressions, occasioned by bony or humoral Tumors, as is seen to happen in the intercostal Arteries by the *Exostoses* of the Ribs, in the *Clavicula*, the *Humerus*, the Elbow, and in the Artery, which pierces the Ligament betwixt the two Bones. The same *Aneurism* happens also in the axillary Artery near the Head of the *Humerus*; and upon that account the Surgeon is obliged to make the Amputation in the Articulation.

THOSE bony or humoral Tumors, compressing the Artery that lies nearest, or which passes into their Body, as it may happen in the latter; 'tis plain, the Blood will rather stop in that Place than in the remaining Part of the Duct: And when this happens, the Serosity of that Blood stopped must needs separate from it, and pass more easily thro' the Pores of the Artery. The Membranes of the Artery, being imbibed with the Serosity, that separates from the Blood, grow more pliant, looser, and consequently more capable of yielding to the Motions of the Heart. Thus the Artery dilates, and makes a Bag, which becomes more or less considerable, according to the Parts wherein it is formed.

A Serosity proceeding from some adjacent Parts, and diffusing it self upon the Artery, may relax its Membranes, and for the same Reasons occasion an aneurismal Tumor.

AN Abscess near an Artery may also be the Cause of that Disease, not only because it may relax that Vessel, but also because the *Pus* corroding the external Membrane of the Artery, or the *Capsula* that contains it, it is no longer able to resist the Impulse
of

of the Heart, with the same Force. Therefore at every stroke of the Piston, the internal Membrane of the Artery will be forced to yield a little, and at last to make a *Hernia* of the Artery. Thus an Abscess may occasion an Aneurism.

LASTLY, Fractures may produce a true Aneurism, by Splinters or Points of Bones, which tearing the *Capsula* or external Membrane of the Artery, weaken it in that Part, and consequently render it less capable of resisting the repeated Impulses of the Heart, &c.

AMONG the external Causes of the true Aneurism, some of them bruise the Membranes of the Artery so much, that the Blood diffuses it self into the Interstices of their Fibres, and relaxes them in such a manner, that they are forced to yield to the Blood, which is always propelled by the Heart; and from thence follows an Aneurism. This happens by a Blow, a Fall, &c. upon those Parts.

THE opening of the external Membrane of the Artery does also frequently occasion an Aneurism, as appears by Bleeding, when the Point of the Lancet has only touched the external Membrane. Mr. *Arnaud* does not deny the Fact; but he says, the Disease is rather a Consequence of the opening of the *Capsula*, or Sheath which contains all the Vessels, and that the Artery which beats still, meeting no longer with any Resistance in that Place, the Artery passes into it by degrees, and Forms a *Hernia*: Which is the proper distinctive Sign of a true Aneurism, and it may also be occasioned by any other cutting Instrument.

THE spurious Aneurism is produced, as I have already said, by the opening of an Artery, and proceeds, as well as the true one, from internal and external Causes.

THE internal Causes of the spurious *Aneurism* are much the same as those of the true; for the Tumor in this *Aneurism* being very considerable, and the Membranes of the Artery being very much dilated, lose their elastick Virtue; so that being no longer able to resist the Impulse of the Blood, they are forced to yield, and break. The Blood coming out thro' the Opening, diffuses it self into the Interstice of the Muscles round about the Artery, raises the Skin, if the Disease lies in the extreme Parts, or is superficial, and by that Means occasions the spurious *Aneurism*. Therefore the spurious *Aneurism* may be superadded to the true.

THE external Causes of the spurious *Aneurism* are also the same as those of the true, *viz.* all the Instruments, that can prick, cut, tear, &c. such as Lancets, Swords, or hooked Nails: Only with this difference, that those Instruments in this sort of *Aneurism* open the Artery wholly, and give in an instant a free Passage to the Blood.

Mr. *Petit* says, there are two Sorts of spurious *Aneurisms*. The one, when the Skin is opened together with the Artery. This happens in Bleeding, or in Wounds occasioned by other pointed and sharp Instruments, which opening the Skin, open also the Artery. The second, when the Artery is opened without the Skin. This frequently happens in the *Scrotum*, as I said, speaking of the *Hydrocele*, in the Tumors of the Bones, in the *Bronchocele*, in Wens, in incysted Tumors, especially near the Knee.

THE diagnostick Signs of those two sorts of *Aneurisms* are very different. The true *Aneurism* appears like a small Tumor round and raised, and attended with a sensible Pulsation, and the Skin always preserves its Colour without any Alteration. If the

Surgeon

Surgeon touches the Tumor, he perceives there is in it a Liquor, which makes it soft and elastick; and if he presses it with his Finger, it withdraws from it.

THE quite contrary happens in the *spurious Aneurism*. The Tumor, far from being round and raised, is flat, and very extensive: No regular Pulsation is felt in it, but a kind of Tremor: The Skin loses its natural Colour, and becomes purple and black: If the Surgeon touches the Tumor, he perceives some hard Bodies in it: Lastly, if it be pressed, it cannot yield and withdraw.

I have said that the true *Aneurism* is nothing but the dilatation of the Artery; and therefore one may easily conceive that the Blood filling up the Bag equally, the Tumor must be round, raised and smooth.

WHEN there is a sensible Pulsation in the true *Aneurism*, it may be explained, with all its Differences, by the natural Mechanism between the Heart and the Arteries. Every Body knows the Heart is a hollow Muscle, which forces the Blood into all the Arteries, as it were, with Strokes of a Piston regularly given, and the Arteries are Tubes, which may be distended by a superior Force, and have an Elasticity to resume afterwards their natural State. Wherefore as often as the Heart drives the Blood into the Arteries, they are forced to yield to its Violence, and to dilate; but as soon as the Heart ceases to drive the Blood, the Arteries unbending themselves, compress the Blood contained in them, are Antagonists, as it were, to the Heart, and are one of the chief Causes of the Circulation. Wherefore a Pulsation happens to be in the true *Aneurism* because the Blood, which makes the Tumor, is covered with the Membranes of the Artery,

Artery, which by their Elasticity make a Resistance to the Heart. But because, as the Tumor encreases, those Membranes grow thinner, and their Fibres are less able to resist the Impulse of the Heart, it follows that their Pulsation is not so strong. Therefore in the true *Aneurism*, the Pulsation lessens, and the Tumor encreases.

THE natural Colour of the Skin depending only upon the regular Circulation of the Juices, with which it is imbibed, and that are under it, it follows, that in the true *Aneurism* the Blood, which makes the Tumor, having a Communication with the Blood that runs in the Artery, must preserve its Fluidity and Heat by the Concourse and Mixture of the new Blood, the Motion whereof is continual. and consequently not being corrupt, and its Parts preserving their Regularity, the Skin that covers the Tumor, must necessarily preserve its natural Colour.

THE Softness and Elasticity of the Tumor, when it is touched, and the withdrawing of the Blood, when it is pressed, may easily be explained by what I have just now said.

THE *spurious Aneurism* being a Tumor made by the Effusion of the Blood, by reason of the Opening of the Artery, and that Blood being no longer restrained within the Pipe that contained it, it must needs diffuse itself on all Sides, and so form a flat and extensive Tumor.

BUT the Blood coming out continually through the Opening of the Vessel, will quickly make a considerable Tumor, or diffuse it self through the whole Part; and if it be in the Arm, it will rather ascend towards the Shoulder than towards the Wrist, because the Aponeuroses of the Extensors of the Arms being strongly fasten'd to the Articulation, the Blood ascends

more

more easily, and frequently diffuses it self into the whole Side, which thereby sometimes becomes excessively swelled and tumefied.

THERE is no sensible Pulsation in the *spurious Aneurism*, for two essential Reasons. First, because the diffused Blood, which characterizes the Disease, has no longer any Communication with the Blood of the Artery. Secondly, because the Arteries in their Pulsations are (as I have already said) Antagonists to the Heart; and when the Fibres of all the Membranes of the Artery are disjoined, whatever be the Cause of it, there is no longer any thing that resists the Stroke of the Piston which comes from the Heart, and therefore no Pulsation ensues. This is the true Reason why the Arteries do not beat in that Part wherein they are cut.

BUT because the arterial Blood coagulates, as soon as it is out of its Vessels, that Blood which is diffused between the Artery and the Part next it, must needs grow hard and form a small Plug (as it were) that will stop the opening of the Artery; so that the Blood in the arterial Canal, rushing against that small Plug, runs quickly out a second time; and flowing to the Circumference, occasions a kind of Noise or Whizzing which lasts till the Blood be upon the first *Coagulum*, where it forms a second Lay. Therefore, the more Lays of Blood there are one upon another, the greater will the Whizzing be.

THE Blood diffused in the *spurious Aneurism*, having no longer any Communication with the arterial Blood, ferments insensibly within itself; its Principles disunite at last, it corrupts, and grows black, so that the Skin transparent, a Membrane appears black and livid like the Body it covers.

LATLY,

LASTLY, The hard Bodies felt in the spurious *Aneurism*, are the Lays of coagulated Blood, which accumulate upon the Artery; and the Impossibility of reducing the Tumor arises from the Bulk of it, and from the Hardness of the extravasated Blood.

THE Prognostic of the *Aneurism*, in general, is that the true one may sometimes last very long, without any Necessity of performing the Operation, and without any great trouble to the Patient, provided it be carefully kept down with Compresses supported by a Bandage, and the Patient do not use any violent Motion: Nay, that Method alone will frequently cure the true *Aneurism*, as well as the spurious, when there is no Extravasation.

THE spurious *Aneurism* is very dangerous, especially when the Effusion is considerable; for, a Mortification and Gangrene are frequently the Consequences of it; and the Operation cannot long be put off, without endangering the Life of the Patient.

IN a Word, because in the *Aneurism* occasioned by Phlebotomy, there is a Necessity of tying the principal Trunk of the Artery; it follows that the Fore-arm and Hand being destitute of Nourishment, will be gangrened, unless the collateral Branches can supply it. Therefore, the Prognostic of the Operation must needs be doubtful.

IT is more difficult to operate in the spurious *Aneurism* than in the true, because in the latter the Artery appears, as soon as the Skin is cut; but in the other, the Surgeon must frequently take away first abundance of clotted Blood, which gives him no small Trouble.

C H A P. XLII.

Of the Operation of the Aneurism.

THERE are two Ways of curing an *Aneurism*, the first is the Bandage, which ought always to be begun with as far as the Distemper will allow, and the second is the Operation.

WHEN a Surgeon has the Misfortune to prick an Artery, he ought, without being frightened, to have the Presence of Mind of observing the Orifice he has made: for if the Skin is cut parallel to the Artery, (which is known by the Blood's coming out freely, without forming any Tumor in the Circumference of the Orifice) the Surgeon ought then to let the Patient bleed till he faints away: Upon which Fit the Blood stops of it self, the Arteries have little or no Pulsation left, and the Dressing may be applied safely, without fearing the return of the Blood.

IF on the contrary the Section of the Skin does not directly correspond to that of the Artery, the Blood in gushing out will strike against part of the Skin; and being thereby reflected back will spread round the Orifice, and there form a small Tumor, which will increase in proportion to the Effusion of Blood. In such a Case the Surgeon would do wrong in letting the Patient bleed till he fainted, because before the coming of the Fit, there would be so great an Effusion, that the Surgeon would be obliged to proceed immediately to the Operation, and the diffused Blood would Hinder the Bandage from pressing upon the Artery. Wherefore, as soon as it appears that the Opening of the Skin is not parallel to that of the Artery, the most effectual Remedy is to stop the Blood.

THE first Piece of the Dressing must be a Paper chewed and well squeezed: Brown Paper is best: it must be applied upon the small Tumor, before the Ligature be taken off, or upon the Opening, if the Patient has been suffered to fall into a Swoon. Upon the Paper the Surgeon lays many graduated Compresses, till he perceives that their Height is great enough for the propping Point of the Bandage to rest upon the Orifice, and outwardly upon the *Cubitus*. He bends the fore-Arm of the Patient that it may always remain in the same Situation, by which means the Bandage will not budge, and then he takes a longitudinal Compress, which he conveys obliquely upwards upon the Bending of the Elbow, and above the internal *Condylus* to pass inwardly above the Compresses, and makes a Circular in the upper Part of the fore-Arm. Afterwards, he makes the Bandage, which is the same as that for Bleeding, only with this difference, that the Surgeon uses a much longer Band.

THE Dressing being thus applied, the Patient having his fore-Arm half bent and supported by the Scarf, must be told not to stir his Arm at all. That Dressing is kept on three or four Days, unless some sad Accident, such as a Mortification or an Hemorrhagy, require its being taken off sooner.

THE Surgeon must not be surpris'd, when, some Hours after the Application of the Dressing, a considerable Swelling happens in the Hand, and fore-Arm: provided the Tumor be soft, though it should reach all along the Arm and part of the Back, and be attendad with an Inflammation, yet the Dressing ought not to be taken off. Nay, sometimes the Parts look blackish; and then the Surgeon must endeavour to know whether that Blackness be not a

certain

certain Sign of a Mortification (in which Case, the Bandage should be removed) or whether it be an *Echymosis*. Those two Things are not then easily distinguished, unless the Surgeon attends to the other Accidents which accompany the Blackness. I shall only observe that the *Echymosis*, which is black at first, grows yellow afterwards.

WHEN there is no occasion to take off the Bandage before three or four Days, the Surgeon takes it off then; and if the chewed Paper sticks still to the Opening, he must not remove it, but on the contrary lay on again the Compresses: and when he removes the Bandage two or three Days after, and the chewed Paper falls of itself, 'tis a good Sign. If any Drops of *Pus* come out then through the Wound, the Surgeon puts into it a balsamic and spirituous Liquor, and never any thing that is moist or oily. He advises the Patient to keep himself quiet; and it is not improper to blood him two or three times in the other Arm.

IF about eight or ten Days after bleeding, there appears a Tumor as big as a small Nut, attended with distinct Pulsations, &c. one may be sure it is a true *Aneurism*, occasioned by the Opening of the *Capsula* or the Sheath, which contains the Artery, the Nerve, &c.

SINCE I have shewed above, that this Disease is a *Hernia* of the Artery, it ought to be minded with the same Care as the *Hernias*, which happen in the Circumference of the Belly. Mr. *Petit* says, that *Hernias* of all sorts are frequently cured by Compression and Bandages; but they must first, be reduced. The Aneurismal Tumor must also be reduced before the Surgeon tries the Compression and Bandage; and when he has reduced the Tumor, he does

not remove his Finger from it, 'till the chewed Paper takes its Place, and then the Compresses, &c. as I have just now said.

SINCE I have compared the *Hernias* of the Belly to those of the Arteries, I must explain, by their Resemblance, the Accidents that would happen, if the Circumstances above-mention'd were not minded. For Instance, if in order to cure an *Hernia*, it was not reduced before the Compresses and Bandages are applied, 'tis certain, that Compression would occasion a Gangrene in the Parts, and all the Accidents, which I have mention'd in their proper Places. The same would happen in the *Hernias* of Arteries; for if the Reduction of the Tumor was not made before the Application of the Bandage, its Compression being unequal, and throwing the Tumor more on one Side than on the other, the Artery would open upon the least Effort, and a true *Aneurism* would become a spurious one, which could only be cured by the Operation, whose Success is not very certain. This, I know, has lately happened; and when the Tumor bursted, Mr. *Petit* was sent for, and performed the Operation.

MR. *Thibaut* saw a Man, who had (I know not upon what Occasion) a small Aneurismal Tumor for the space of eighteen Years. The indigent Condition he was in obliged him to come to *Paris*, where he was taken up begging in the Streets, by the Constable appointed for that Purpose. Those Men, when they seized him, did so much compress the Aneurismal Tumor, that two Days after so great an Effusion happened in the Arm and fore-Arm, that the Patient was removed from the Hospital to the *Hotel-dieu*, where the Operation was performed upon him; and it appeared that the first Tumor was a sort of *Cystis*, which

which had resisted the Force of the Heart for the Space of eighteen Years.

SOME Steel-Bandages to be found in the Shops of Truss-makers are also recommended for the Compression of those Tumors. Their Uses are also approved by the best Surgeons; but they ought to begin with the Bandage which I have just now described.

IF the first Method of curing *Aneurisms* has not been as successful, as was expected; but on the contrary, the *Aneurism* is very much encreased; or is become spurious; or if the Effusion, in this latter Case, threatens a Gangreen, the Surgeon must proceed to the Operation; and in order to it, three essential Circumstances ought to be carefully attended. The first is to prevent the Effusion of Blood during the Operation; the second, to lay open the Artery; and the third, to make a Ligature upon it.

THE Blood cannot well be kept in but by compressing the Artery with the Help of a Noose and *Tourniquet*; but because in that Disease the Arm frequently loses its usual Figure, by an extraordinary Swelling, it is requisite to know which is the most proper Place to apply those Instruments in such a manner that without occasioning any Disorder, they may, on the contrary, answer the Surgeon's Intention.

THAT Place is of two Sorts, either of Choice or Necessity. The Place of Choice is always in the internal and middle Part of the Arm, and not lower, that there may be at least four Fingers between the Compress and the internal *Condylus*, because the Surgeon is frequently obliged to go on with the Incision as far as that Place, in order to take out the Clods of Blood, and relax the Skin.

THE Place of Necessity is obvious by the Swelling of the Arm; for the Blood which is run back, as I

have explained it above, would not only hinder the Ligature or the Noose from compressing the Artery sufficiently, but also might bruise the Parts upon which it is applied, and occasion a Gangrene. Wherefore to avoid a great Pain, and the sad Consequences already fore-seen, the Surgeon has recourse to the Place of Necessity, lying under the Arm-pit, where he lays a pretty thick Compress, that he may the better tie the Vessels, and of a round Figure, that it may lie conveniently in the Hollow of the Arm-pit, and not bear hard upon the great pectoral Muscle, and the *latissimus Dorsi*, nor bruise them, and that by such Means the Compression may be directly upon the Vessels. Above that round Compress the Surgeon applies a longitudinal Compress, which runs crossways upon the Shoulder. Afterwards, he turns the Ligature twice over that Compress, and ties it upon the Shoulder with a single Knot, and a Loop. He conveys over the Shoulder, between the Ligature and the Compress, a round Piece of Paste-board or Horn, that the *Torniquet* may not hurt the Skin, &c.

IF the Surgeon uses the *Tourniquet* in the middle Part of the Arm, which is the Place of Choice, he must first of all lay a long, narrow, and very thick Compress upon the internal Part of the Arm, upon the crossing of the Vessels. He supports it by another long Compress in three or four Doubles, and conveys the Ends of it one over the other in the internal Part of the Arm. Lastly, he lays the Ligature and the round Piece of Paste-board, as I have already said.

THREE Circumstances ought to be observed, in order to apply the Noose well. First, the *Tourniquet* to turn but once or twice at most, in order to

stop

stop the Blood. Secondly, the *Tourniquet* must be applied in a direct opposition to the Vessel, as well as the round Piece of Paste-board, Leather or Horn. Thirdly, the Knot must be turned towards the hind Part of the Arm, that it may not be in the way of the Servant, who holds the *Tourniquet*.

THE Operator being very much embarrassed by a great number of Servants, we are extremely obliged to those who enable us to operate with few Persons; and therefore I cannot forbear observing here how much we are indebted to Mr. *Petit* for inventing a *Tourniquet*, which has all the Conveniences of the other Instruments, and none of their Inconveniences, as I shall shew, when I come to discourse of Amputations.

To observe the second Circumstance, which consists in laying open the Artery, I suppose the Patient to sit upon an Elbow-Chair, towards the Light. The *Apparatus* being ready, and the *Tourniquet* well placed, the Surgeon bids a Servant streighten the Noose in order to compress the Artery, and makes an Incision upon the Tumor, which affects only the Skin at first. That Incision ought to be made in such a manner as to begin in the middle of the forearm; and the Instrument is conveyed obliquely towards the internal *Condylus* of the *Humerus*.

AUTHORS advise the Use of a Lancet for that Incision. Mr. *Arnaud* and Mr. *Petit* say, that Instrument should never be used, when the Surgeon has a mind to avoid offending some Parts, and is afraid of something; and therefore they prefer the *Bistouri*, because an Operator well skilled in handling that Instrument can see what he cuts.

AFTERWARDS the Surgeon makes small Incisions with a *Bistouri* in the fatty Body: and when he per-

ceives a small Clod of Blood, he may be sure the *Cystis* is open ; and then he introduces a Finger into it, and over that Finger he conveys crooked and blunt Scizars to make an end of the Incision.

If that Incision does not appear sufficient to take off all the coagulated Blood, Mr. *Arnaud* advises one to make another from the middle of the first to the hinder Part of the Arm. This second Incision is very useful ; for it affords more room to evacuate the Blood and wipe the Wound, besides it relaxes the Skin very much ; which is no small Advantage, since the Skin frequently makes a greater Constriction than all the other Parts.

WHEN all the Effusion is thus exposed to view, the Surgeon perceives two Sorts of Blood ; one, that is only half coagulated, the most superficial, and the last that came out of the Artery ; the other to be seen next is like a *Coagulum*, and in Lays, as I said before, that are harder as they lie nearer the Artery. Afterwards, the Operator takes off the Clods and Lays of Blood, with a Fleam or Myrtle Leaf, till he sees the *Aponeurosis* of the *Biceps* : Then he bends a little the Patient's Arm, to relax the *Aponeurosis*, and introduces under it a Stilet or a grooved Probe, over which he conveys crooked and bent Scissars to cut it in the Place of its Insertion, and then he raises it, and cuts it about its Original ; and by that means he relaxes a considerable Constriction occasioned by it ; besides, that it is a great Hinderance to the Operation by concealing all the Vessels.

THERE are still under that *Aponeurosis* some Clods of Blood, which must be taken off, especially that which came out first, and which being moulded in the Figure of the Orifice, corks up, as it were, the Artery. That Clod, tho' the nearest to the Artery, is the

the first that comes out, as I have already said; and being of the oldest standing, it must needs be the hardest. Lastly, when the Surgeon has cleared the whole Tumor from the several Lays of Blood, he relaxes the *Tourniquet* a little, that he may easily see the Opening of the Artery, &c.

THE third Circumstance to be observed in that Operation, consists in preventing the Artery from emitting any Blood thro' its Opening; and therefore our modern Operators use the Caustick, or the Ligature. If the Caustick be resolved upon, Mr. *Arnaud's* Practice is as follows. As soon as the Orifice of the Artery is layed open, he takes a Piece of fine worn out Linnen; he dips it in a liquid Caustick, which he prefers to all others; he squeezes it, lest any Drops should get into the Cavity of the Artery; afterwards, he applies it directly upon the Orifice of the Artery, and over that small Tent he lays a small Compress, and round about dry Terebinthine, or Colophony. Over that Compress he lays another somewhat larger, and so on, till they rise to a proper Height, taking care to keep always his Fingers upon the compresses. He takes off the *Tourniquet*, and makes the Bandage, as I shall shew hereafter.

I shall only observe by the Way, that Mr. *Petit* in all the Operations never uses dry Terebinthine, Colophony, or any Astringent for some Reasons, which I shall mention, when I come to discourse of Amputations.

THAT Dressing is kept on five or six Days; and when the Surgeon has a mind to take it off, he must always have a *Tourniquet* ready. He loosens the Ligature, taking Care always to press the Compresses with his Fingers. He takes them off one after another,

ther, and does not touch the last, till they fall off themselves. Suppuratives or Ointments must never be used, but the Dressings are to be performed dry with the Compresses, Dozels, &c.

WHEN the Compresses and the small Rag are off, the Surgeon perceives in the Artery a whitish Place, where the Pulsation is more sensible. That is, the Place where the Division was: It must not lie uncovered long; but the Surgeon must speedily apply upon it a pretty hard Dozel, strowed with Powder of dry Terebinthine, &c. in order to produce good solid Flesh about the Artery, and then lay on the Remainder of the Dressing, as I have said above.

THE Patient's Arm must be bent in such a manner as to represent only a blunt Angle, supported by the Scarf, and leaning upon a Pillow. The Patient must be blooded more or less, according as the Accidents require it; and he ought to observe a strict Diet.

WHEN the Operator resolves upon the Ligature, which is now most in use, because Surgeons are persuaded, that tho' the Artery be tied in its Trunk, yet the Arm lives still, since it receives Blood from three Branches, which issuing from the Trunk out at three Branches open into the interossous Artery, and the two others into the radial and cubital; I say, when the Operator resolves upon that Operation, he bends a little the Patient's Fore-arm to relax the Vessel. Afterwards, he uses a square *Herina*, which is better than a crooked one. It must be blunt; and the Surgeon introduces it into the Orifice of the Artery. He raises it a little, holding the *Herina* with his left Hand; and with his right he takes a sharp *Bistouri*, with which he dissects the Artery, and divides it from the Nerve and Vein attending it, when there

is room under the Artery, the Operator puts in his Herina and he raises it, and dissects a little above and beneath the Opening, but as little as possible; and then he passes into it a crooked Needle, threaded with a waxed Fillet, made up of four or six Threads, as I have explained it, speaking of Sutures.

MR. *Arnaud* advises one to pass that Needle under the Artery, with the Head first, for fear of pricking it with the Point, to pass only one half of it, and bid a Servant hold it in that Situation, lest the Edges of the Needle should cut the Artery: And in the mean time the Operator must draw the Threads sufficiently to hold in the middle on one Side; and on the other he must withdraw the Needle.

MR. *Petit* has invented a Needle, which is neither sharp pointed, nor very blunt: It has no Eye at the Head, but a small handle which serves to hold it more safely: It is crooked, without Edges on the Sides, or the Edges are very blunt, and it has an Opening in the middle to pass into it the waxed Fillet; so that with that Instrument, the Operator can pass the Thread under the Artery, and withdraw the Needle, without pricking or cutting the Artery.

HE cuts the Fillet in the middle with a pair of Scissors to make two Ligatures out of it, one of which he conveys over the Orifice of the Artery, and the other under it. Afterwards, he lays a small Linnen-Roll upon the Artery which reaches from one Ligature to the other, he makes at first a single Knot with the upper Ligature to tye the Artery hard, and above it a double Knot; and then he unbraces the *Tourniquet*, to see whether the Artery be well tied, which he knows, when no Blood comes out: Afterwards, he cuts those Threads at six Inches distance from the Artery. He does the same in the lowest Ligature to
stop

stop the Blood, which discharges it self into the remaining Part of that Vessel through many small Branches falling into the Artery, as it appears, not only by Injections, but also by the Operation; for, when those Ligatures are made, if the Surgeon unbraces the *Tourniquet*, he feels the beating of the Artery under the lower Ligature. This Mr. *Petit* made me observe, when he performed an Operation of the *Aneurism*.

Mr. *Arnaud* and Mr. *Petit* have observed, that when they had dissected the Artery, as I have just now said, there was always some Blood upon the Dressing, which could only proceed from small collateral Vessels, that were cut, and were so small in the time of the Operation, that they could not be observed; but being insensibly dilated by the great Quantity of Blood conveyed into them, they became very considerable, and afforded a great deal of Blood. In order to avoid that Accident, those Surgeons do not dissect the Artery: they only take care to separate the Nerve from it; and then they convey the Needle under the Artery, taking with it the Flesh, and not the Nerve; and if a Surgeon uses Mr. *Petit's* Needle, he draws one End of the Fillet on one Side, and the other End with the Needle on the other. He makes under the Orifice of the Artery, a second Ligature in the same manner; he cuts the Thread in the Middle; he lays on the small Roll of fine Linnen, and the rest, as I have said.

WHAT remains is to lay on the Dressing, which I would not encumber with many Tents, as 'tis generally practised, being persuaded that the Ligatures above described are sufficient to stop the Violence of the Blood, and that a great Number of Dozels, and small Compresses heaped up one upon

upon another, to such a Height as is required, do compress all the internal Vessels, and external Bandages, that the Blood of the Veins remaining in the fore-Arm without Motion, and the Arteries affording none any longer (because the Pressure of the Tents hinders the small Branches of the Artery from dilating, and affording Blood to the interossous, radial, and cubital Arteries, as I have said) the Mortification of the fore-Arm must ensue, which happens but too frequently.

I would therefore dress that Wound with a small Compress, narrow, and somewhat long, to be applied all along the Artery; and I would put about that Compress some soft Dozels, and upon the Whole some plain Lint, without making any Plagets or Dozels of it. The Surgeon should cover that Dressing with a small square Compress in three or four Doubles, and dipt in Brandy: and above it a simple one longer, and dipt in Brandy, with which he makes two Circulars, one in the lower Part of the Arm, and the other in the upper Part of the fore-Arm. He covers again those Compresses with a longitudinal one, which he passes obliquely upwards, over the upper and fore-part of the *Radius*: He conveys it obliquely above upon the Fold of the Elbow, and under the internal *Condylus*, to pass inwardly above the Compresses, upon which he always keeps his Fingers, and to make at last a Circular in the upper Part of the fore-Arm.

THE Bandage proper to contain that whole Dressing, is the same as for bleeding, but the Lint ought to be much longer. When that Lint has been used, the Surgeon applies a longitudinal Compress all along the internal Part of the Arm, to compress the Artery a little; and he supports that Compress with Edgings made with another Lint rolled with one Head. He
begins

begins to apply the last List about the middle Part of the fore-Arm, and conveys it as far as the Shoulder. Before the Surgeon begins those Bandages, he must place the fore-Arm in such a manner as to make a blunt Angle with the Arm.

AFTERWARDS, he shall cover the whole Arm with large Cloths dipt in warm Wine, wherein Brandy is predominant. The Arm must be kept in a Sling, because it frequently happens that those Patients falling into Convulsions, stretch out their Arms, and break the Artery.

Of the Triangular Scarf.

It is easier to make the Bandage, called the *Triangular Scarf*, with a square Napkin, than with a long one ; yet because the latter is more common than the other, I shall give a Description of it.

THE Surgeon takes the Napkin with his left Hand by one of the Angles, and leaves it thus hanging : Afterwards he takes, with his Thumb and fore-Finger of his right Hand, the Angle nearest to him, and bringing it near that which he holds with his left Hand, he conveys it, sliding upon the Hem, till it can descend no lower. I suppose the Operation to have been made on the left Side. The Surgeon shall place foremost the Angle of the Napkin, which he holds with his left Hand, upon the right Shoulder ; and those Parts of the Napkin, which he holds with his right Hand, shall be opposite to the affected Elbow. Having thus applied those two Heads, he bids a Servant hold the Head, that is upon the right Shoulder, and the Surgeon raises the opposite Head, which hangs down, to cover the fore-Arm with it, and to convey it upon the left Shoulder, that he
may

may afterwards tie it upon the right, together with that which was first applied there. What remains, is only to fold and hide the End and the uneven Parts of the Napkin, to be found in the hinder Part of the Arm, and to pin them: which makes a very convenient and neat Bandage.

AFTERWARDS, the Patient lies upon his Back, and they put a Pillow by him to lean his Arm upon. Care is taken to lay over that Pillow a waxed Cloth, that it may not be imbibed with the spirituous and hot Fomentations, with which the whole fore-Arm and Hand are to be hourly moistened Night and Day, taking care to lay over the whole a Sheep's Skin, which must be warmed every time.

ALL those Precautions do sufficiently shew, that the Surgeon's Design is to preserve artificially the Heat of the fore-Arm, as much as possible, till Nature finds out a way to diffuse into it that precious Liquor, whose Passage we have obstructed, and which cannot be long absent without the Loss of the Member.

THE Surgeon shall frequently examine the Hand, since the Condition it is in makes him judge of the Event of the Operation; and among all the Signs which I have mentioned, he must know that the Pulse is not felt at the soonest, till four and twenty Hours after; and it frequently happens that he does not perceive it for three or four Days. However, he must not infer from thence that there is a Mortification, since notwithstanding these Accidents the Hand may still enjoy a Life common to the whole, as it appears from the Heat of the Part.

It is also proper to leave the *Tourniquet* loose during four and twenty Hours, that it may be used upon occasion; for if the Blood should come out, a Servant, or the Nurse, might brace the *Tourniquet*, whilst

whilst the Surgeon is sent for. But if he was at a great distance, and could not come soon enough, the Use of the *Tourniquet* would be dangerous, because it deprives the Arm of Nourishment and Sense by its strong Compression: and therefore it were better for the Servant to lay his Fingers upon the Artery, in order to stop the Hemorrhagy. To remedy these Accidents, Mr. *Arnaud* leaves always a waxed Fillet under the Artery, that it may be ready at Hand to make a Ligature somewhat higher upon occasion.

THE Wound is dressed every Day much in the same manner as I have said, by using a Caustick, that is, by letting fall the Compress lying upon the Artery, and the Dozels alone, and imbibing the whole Dressing with warm Brandy; and then the Surgeon applies some Plagets covered with a Digestive, &c.

THE Patient is blooded in the other Arm, more or less, according as the Accidents require, and according to his Strength. He takes a Clyster every Night, and keeps a strict Course of Diet, that is, he takes only Broth every three Hours, and now and then some Spoonfuls of Jelley.

IF that Operation be performed for a true *Aneurism*, the Surgeon must go about it in the same manner; but he must open the Tumor with greater Caution, cut the fat Body gently, and even tear it, as in the Operation of the *Bubonocèle*: and as soon as he perceives the Bag, he conveys, with its help, upwards and downwards a grooved Probe, to cut with a Razor or a *Bistouri* what lies upon the Groove, and to enlarge the Opening by that means. And when the *Hernia* of the Artery lies open, he divides the Nerves from the Artery, as in the spurious *Aneurism*, and makes a Ligature above and under the Tumor, in
the

the manner above described. Afterwards, he opens the Bag, according to the Length of the Artery, to let out the Blood contained in it; and then he unbraces the *Tourniquet*, to see whether the Blood be well stopped, and dresses the Patient after that Operation, as I have shewed, speaking of the spurious *Aneurism*.



CHAP. XLIII.

Of the Wounds of the Tendons in relation to their Sutures.

THE Tendons, as well as all the other Parts of the humane Body, are liable to be cut, torn, pricked, or bruised.

THOSE different Solutions of Continuity, which happen in the Tendons, do generally proceed from external Causes, such as bruising, or sharp Instruments, or Falls; yet they may be occasioned by Fractures; for a Splinter of a Bone may cut, tear, or prick a Tendon.

THE Accidents arising from the Wounds of the Tendons are very dismal, and differ according to the different Solutions of Continuity. For Instance, if the Pain of a Tendon, either pricked or torn, is very great, and even threatens Death; and if, according to the Advice of all good Surgeons, the Tendon be cut off; then all the dismal Symptoms vanish, and the Patient finds himself eased: Which shews, that among all the Indispositions of a Tendon, the total Section of it is attended with the fewest Accidents.

On the contrary, when a Tendon is torn, or half cut, pricked or bruised, the Patient is affected with violent Pains, a continual Fever, a *Delirium*, Convulsions, and other dangerous Accidents.

A Tendon being a very stiff and distended Organ, is liable to the least Concussions, and consequently its Wounds must needs be attended with sharp Pains.

AND because the remaining Fibres of a Tendon, that is half cut, can make but a weak Resistance to the violent Contraction of the Muscles, since they have lost those Fibres, which helped them to resist, there must needs be a violent and frequent Reflux towards the Brain, attended immediately with a Return of the Spirits into the wounded Part, which occasions violent Pains; and they will encrease as the Drawing becomes more considerable.

THE more the Pains encrease, the greater is the Reflux of the Spirits, and their Motion growing thereby very rapid in the Brain, must needs be also vehement in all the Parts of the Body, and by a necessary Consequence those irregular Spirits putting the Blood into a great Motion, must occasion a Fever. The Blood being agitated, as we suppose it to be, may produce very bad Symptoms; and they may easily be accounted for by a Surgeon never so little acquainted with the Mechanism and Use of the Parts of the Humane Body.

THE *Delirium* and Convulsions depend also upon the irregular Motion of the Spirits, which is a Consequence of their violent Reflux from the wounded Part to the Brain.

IF the Tendon be pricked, the Pain is felt not only in the Solution of Continuity, but also in very remote Parts.

FOR Instance, if the Tendon of the *Profundus Inflexor* of the Fingers, is pricked at the Fingers End, the Patient will feel a Pain all along the Hand and Fore-arm, as far as the internal *Condylus* of the *Humerus*, from whence that Muscle proceeds. And because the Inflexors of the Fore-arm are inserted near the Original of that Muscle, 'tis plain it will communicate to them its Inflammation ; which is the Reason why the Patient feels a Pain in the Shoulder and under the Arm-pit, and why the Glands of that Parts swell, and are apt to form an Abscess.

WHEN the Tendon is bruised, the Blood and the Lymph, which diffuse themselves into the inside internal Parts of the Fibres will ferment, their Salts will disentangle themselves, and grow more gross, and consequently will be more capable of irritating the tendinous Fibres. And because I have said, they are very susceptible of a shivering Motion by reason of their Distension, it follows that the Pain and the ensuing Accidents will be considerable in the Contusion of a Tendon.

THE Prognostic of the Wounds of the Tendons in general is very bad ; and the Fever attending them is not only very dangerous in it self, since it occasions all the Symptoms that proceed from the great Agitation of the Blood, but is also very pernicious to the Wound, because that Part grows thereby more sensible, and the Humour which at that time extravasates in the Part, being also more serous, becomes more acrimonious and corrosive.

It may be further added that the Prickings of the Tendons are frequently attended with an Abscess in the Parts remote from the Illness, as I shall shew, by some Instances, when I come to discourse of the *Panaris*, and consequently they are very dismal.

As for what concerns the Cure of those Diseases, the Ancients thought the Tendons could not be re-united, because, said they, those Parts, are spermatick; and carried away by that Paradox, they maintained the Wounds of the Tendon of *Achilles* to be mortal. But those Parts being nourished with Blood, as well as all others, and the Bones and Cartilages, though more solid, being capable of Reunion, it necessarily follows that the Tendons are also capable of Reunion. Many Practitioners have cured the Wounds of the Tendon of *Achilles*; and Mr. *Thibaut* made a Suture in it at the *Hotel-dieu*, when it was wholly cut off; and that Suture had good Success. Mr. *Coste*, Sworn Surgeon of *Paris*, heretofore Master of his Company, and Demonstrator of Anatomy, told me he had made it several times, and that it always succeeded. The following Instance confirms this Opinion, and proves undeniably that the Wounds of the Tendon of *Achilles* are not mortal.

A Man falling into a Sink, near the small Stalls, not far from the *Bastile*, his Foot slipped: he felt immediately a great Pain in his Heel, which was quickly attended with a considerable Inflammation, without being able to walk, or lean upon his Foot. The Surgeon being sent for applied emollient and softening Remedies, as the Indications seemed to require, without forgetting to blood the Patient; but the Accidents encreased instead of lessening. Whereupon the Patient four and twenty Hours after, sent for Mr. *Poncelet*, sworn Surgeon of *Paris*, heretofore Master of his Company, and Demonstrator of Anatomy and Surgery, who having observed a small Tumor, opened it immediately: A little Blood came out of it. That Tumor was hardly opened, when he perceived

perceived the hinder Part of the *Calcaneum* fractured; and because the Piece shook, he cut the Tendon of *Achilles* adhering to it, and pulled the Piece out. After the Exfoliation of the Tendon, and the Cure of the Wound, the Patient walked as well as if that Tendon had not been cut.

WHEN the Tendon is half cut, and the Accidents above-mention'd are not yet violent, Mr. *Duverney* advises to cure that Wound with the Balsam of *Fioravanti* and *Copahu*, and the Oil of Eggs mixed together.

THE Patient must be blooded three or four times, without any delay; he must take Juleps and softening Clysters; and if all those Remedies do not lessen the Accidents, the Surgeon must resolve to cut the Tendon; and when the Fluxion is very much lessened, he must make the Suture.

IF the Tendon is wholly cut, the making of the Suture is thought to be a sovereign Remedy. But that Rule is liable to some Exceptions: for in some Cases that Operation is altogether impossible; in others, it is possible, but dangerous: Lastly, upon some Occasions it is of no manner of Use.

When a Tendon, that is cut, has lost a great deal of its Substance; when the Ends of it have considerably withdrawn themselves into the Flesh, and 'tis impossible, by disintangling them, to bring them near one another; the Frictions which Surgeons advise to be made downwards upon the Body of the Muscle, are of no great Use. Mr. *Petit* says, That Method seems indeed to have a good Effect upon a Corpse, but that it has not the same Success upon living Bodies. When therefore, by reason of a great Loss of Substance, the Ends of a Tendon cannot be brought together, the Operation is impossible.

THOUGH the Ends of a Tendon, that is cut, may come near one another, yet it ought to be observed, that if they are bruised, the Suture would occasion such sad Accidents, that the Surgeon would be obliged to cut it; from whence it appears, that the Operation would prove dangerous. On the contrary, in such a Case, a gentle Suppuration ought to be excited, as I shall say hereafter, and when the Inflammation and Contusion are dissipated, the Suture may be tried.

THE Extensors of the Fingers being very flat, and their Teguments being closely united all along their Progress with the *Periosteum*, of which they even seem to be formed, it appears by that Structure, that if the Tendons happen to be cut transversely, the inverse Situation of the Hand is alone sufficient to make them grow together again, and consequently, that in such a Case, the Suture is very useless, as well as in the Flexors of the Fingers, and the Extensors of the Toes.

The pricking of a Tendon being a very small Wound, which occasions dreadful Pains, very sad Accidents, and great Inflammations, the Relaxation must be tried with softening Remedies: Bleeding is of great Use to that End, and likewise cooling Ju-
 leps and Potions. The Topical Remedies ought to be moistening and spirituous mixed together; and the Surgeon must take care to keep the Wound open, till all the Accidents are over, and instil into the Wound some Balsam of *Fioravanti* and *Copahu*, mixed together with Oil of Eggs: And if the Accidents continue, the Tendon must be cut; a gentle Suppuration must be excited, and a Suture made, when the Acuteness of the Pain is over.

LASTLY, if the Tendons are bruised, the Surgeon must

must uncover them, and excite in them a gentle Suppuration ; which is easily perceived, because when they exfoliate, they come out like Flax. And if notwithstanding all these Precautions, the Accidents encrease instead of lessening, the Tendon must be cut, and when the bad Symptoms are over, the Surgeon makes a Suture.



C H A P. XLIV.

Of the Operation of the Suture of the Tendon.

THAT Operation being usually performed upon the Extensors of the Fingers, when they are cut in the upper Part of the *Metacarpium*, or upon the Wrist, Mr. *Arnaud* advises one to cut the annular Ligament in order to look for the Tendon.

IF two Tendons are cut, and shrunk, as it always happens, because the Patient bends his Fingers immediately, that Situation being more convenient ; the same Surgeon advises one to stretch out the Hand, and to make, with a very sharp *Bistouri*, a small longitudinal Incision in the Skin, directly between the two Tendons, without hurting them, or taking off their Cover, which is the best Plaister that can be applied upon them. Afterwards, the Surgeon endeavours to bring both Ends together, by stretching out the Hand very much ; for, I think, it is the only way of doing it.

MR. *Petit* advises one not to remove the Tendons, if possible, from the adjoining Parts ; but if their Division was so old, that they were grown

callous at their Extremities, and adhered to the neighbouring Membranes, the Tendon ought then to be separated from them a little, but not towards the Skin, as I have already said, and the callous Extremities should be cut, to open the tendinous Fibres, that they may let out the nutritious Juice which is to reunite them.

ALL the Moderns advise one to take the End of a Tendon, that is cut, with small Pincers, armed in the Inside with small Teeth, the better to take hold of the Tendon, and a Ring to streighten very close the Branches of the Instrument, that are to pinch ; and then to draw the End of the Tendon in order to bring it near the other End, and holding the Forceps with the other Hand, as I shall say hereafter.

MR. *Petit* does not approve this Practice : He says, it may bruise the Tendon to such a degree, that it will occasion an Inflammation, and consequently a great Suppuration, which taking off a great deal of the Substance of the Tendon, will prevent its Reunion. On the contrary, he advises one to pierce it in the Middle, together with the Skin, without altering its natural Situation, without Pincers, and then to stretch out the Hand, in order to bring the two Ends together.

ALL these things being duly observed, the Surgeon shall proceed to the Operation. But because the Needles he must use, are very small, and the right Hand could not drive them safely, and at once into the Skin and Tendon, without shaking, nor the left Hand support the opposite Part, the Operator ought to use additional Helps proper for both Hands, *viz.* the Port-needle, and the small *Cannula*, as I observed, when I discoursed of the Hare-lip.

NEEDLES for the Suture of a Tendon must have quite

quite another Figure than for all other Sutures, that they may not destroy the Fibres of the Part. First, they must be crooked, because 'tis an easy thing to withdraw those Sorts of Needles. Secondly, they must only be sharp in their concave Part to separate only the Fibres of the Tendon, wherein they differ from the Needles for the Sutures of the other Parts, which are sharp on the Sides, and cut the Fibres on the Sides. Thirdly, their Eye must correspond to the Edges of the Needle, that is, lye on the Side of the concave and convex Part, that the Bulk of the Thread may not make the Wound gape, and that the Needle may pass more easily.

WHEN the Operator has got a proper Needle, it must be threaded with a double and waxed Thread, forming a Loop in the Middle. Afterwards, he will insert that Needle in the Port-needle, surrounding first the Head of the Needle with a fine small Rag, or a Piece of Paper, that it may not waver in the Grooves of the Port-needle. And, as I have already said, discoursing of the quilted Suture, that the first Stitch ought to be made at the Extremity of the Muscle, opposite to the Origin, because it shrunk in more; here we must use the same Precaution, and pierce first the End of the Tendon opposite to the Origine of the Muscle, because it shrinks most.

THE Surgeon holding in his right Hand the Port-needle, armed with the Needle just now described, shall pierce the Skin and Tendon, at the same time, from the Outside inwards, and about two Lines from the Extremity, securing the Part with the Thumb and Fore-finger of his right Hand, or holding in that Hand the small *Cannula*, which I have proposed as a Help. Afterwards he shall loosen the small Ring of the

the Port-needle, to leave the Needle free, that he may draw it by the Point, holding the Thumb and Fore-finger upon the Skin on both Sides of the Tendon. The whole Thread must not pass through the Wound, which the Needle has made; but the Surgeon must put in the Loop which we have left in the Thread, a small Peg; consisting of a Piece of waxed and rolled Taffety; for those sorts of Wounds require Pegs to prevent the Thread from cutting the sutured Parts, because the Lips of the Division are naturally apt to keep asunder.

WHEN the Operator has brought the small Peg near the Skin, by drawing the Thread, he puts the Needle in the Port-needle, and passes it through the other End of the Tendon from the Inside outwards, taking the Skin with the Tendon, and using the same Precautions. Afterwards he adapts the two Ends of the Tendon in such a manner, that one of them may pass over the other; and then he keeps the two Threads asunder to put between them a second Peg of waxed Taffety: he makes a single Knot, and a Loop over it.

THE waxed and rolled Taffety is more proper than Linnen, because it is firmer, and makes a greater Resistance, though it be pliant, and capable of assuming the Figure of the Part; and lastly, because it does not imbibe the Pus that comes out of the Wound, and therefore will occasion no *Erysipelas*, as I observed, when I discoursed of the quilted Suture.

THE Surgeon pours upon the Wound some Drops of a spirituous Balsam, and puts between the two Pegs a Plaget dipt in the same Balsam, and over the Whole, a Compress dipt in Brandy, fastening the Dressing with two or three Circulars of a small Lint.

THE

THE Surgeon always takes care to keep the Hand stretched out during the Dressing, and makes an Embrocation upon the whole Limb, especially all along the Muscles whereof the Tendons are cut, and towards the Origin of the Nerves, which enter into them. The following Embrocation appears to me very good.

TAKE an Ounce of Worm and Fox-oil, an Ounce of Man's Fat, and half an Ounce of Worms-juice : mix the whole together : Warm, upon a Plate, as much of it as you please : Add an equal Quantity of *Brandy* to it ; and rub the Limbs with it before a *small* Fire.

Do this three or four times a Day, while the Patient is under your Cure, and cover every time the Fore-arm with Compresses dipt in warm Wine.

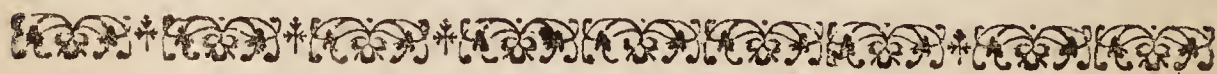
Now the Fore-arm and Hand must be put into an Engine, that will always keep the Hand stretched out. Mr. *Arnaud* has invented one of Tin : It is made like a Gutter, and contains the whole Fore-arm. In the place of the Elbow there are two Notches, one on each Side, to lodge the Arm, that the Engine may equally serve for both Arms ; but on the Side of the Hand, that is, a Finger's Breadth beyond the Wrist, there is a Hinge, to which is added a Plate of Metal, with the Help of a Peg, which goes into the Hinge. That Plate makes an Angle more or less obtuse with the Gutter, with the Help of two Hooks, one on each Side, which from the Plate wedges in the Holes upon the Edges of the Gutter ; and by that means the Fore-arm is lodged in the Gutter, and the Hand is stretched out upon the Plate, which must be a little longer than the Fingers. And because the Patient might still bend his Fingers, they have engraved in the Middle, and on both Sides of the Plate two Chinks, through which they pass a Fillet,

Fillet, which straitens and brings the Fingers near the Plate. But if the Suture had been made in the *Extensor* of the Thumb, it were needless then to keep all the Fingers in the Stocks, when only one of them is disordered, and therefore to avoid that Fault, the same Surgeon uses a small Plate narrower than that I just now described, and notched on the Side of the Fingers, that they may easily bend.

To make a good use of the Engine, the Surgeon puts into it a Lay of Oat-straw, adapted to the Figure of the Arm; and a small Cushion of Oat-straw upon the Plate, and then places the Fore-arm and Hand upon the Dressing. Afterwards he covers the Hand and Arm with Compresses dipt in warm Wine, and supports the whole with several Lists, about the Engine and the affected Limbs.

In proportion as the Wound cicatrizes, the Surgeon shall lower the Plate, by means of the Hooks, and continue to use the same Ligament, without putting so much Brandy into it as in the Beginning. He shall gradually give some small Concussions to the Part, rubbing it with the warm Liniment, that the Tendon may grow pliable, and lengthen by degrees; for without such a Caution the Part would be in Danger of being always bent.

BLOODING is good to prevent an Inflammation and a Fever. The Patient must keep to a moderate Diet.



CHAP. XLV.

Of the Panaris.

BY the Word *Panaris*, I understand a Collection or Effusion of some Matter, which commonly takes

takes up the Extremity of the Finger, and begins most times with a small and hard Elevation, without any great Pain and Alteration of Colour; but in time it enflames, grows very red, and occasions several Accidents more or less dangerous, according to the Parts in which the Effusion is contained.

It appears from this Definition, that the *Panaris* does not always lie in the Extremity of the Finger; that it is not always an apparent Tumor, and that there are several kinds of it, as I shall shew hereafter.

THE Collection or Effusion of the Liquor, which occasions the *Panaris*, fermenting slowly, produces generally an Abscess; and it may be said that of all Abscesses none are more painful than the *Panaris*, by reason of the particular Structure of the Skin, and by reason of the Parts, of which the Fingers are made.

By the Structure of the Skin at the End of the Fingers, the Learned Mr. *Duverney* observes, that there are many small *Sulcus*'s, partly spiral, and between these *Sulcus*'s, there are two rows of nervous Papillæ; whence it is that the Fingers are more sensible than the other Parts, and by that Mechanism, Pain must needs be greater there than any where else.

As to the Parts, of which the Fingers are made it is well known by Dissection, that there are in the Inside of each Finger two Arteries, one on each Side, which reaching to the Extremity of the Finger, join and divide into a Million of small Vessels. Besides, there are two Nerves, one on each Side, which take almost the same Course. Lastly, if we consider the admirable Disposition of the Sheath of the Tendons, the Tendons themselves, which slip in, and the *Periosteum*, it will plainly appear that the
least

least Disorder in those Parts must needs occasion more violent Pains than in all the other Parts of the Body.

THUS I have given a general Notion of the Structure of the Fingers; and I think this is a very proper Place to mention the several Kinds of *Panaris*, about which Authors are as little agreed as about the Causes of that Disease, and the Method of curing it.

I know four kinds of *Panaris*. The first is a small Tumor, which happens under the *Epidermis*, sometimes at the Finger's End, frequently in the external Part, and at the Root of the Nail, and sometimes on the Sides.

THAT small Tumor begins sometimes in one of the Sides of the Nails, and goes round to the other Side: hence it is that People call it *Tourniole*. The Vulgar calls also that small Tumor a *Chance-Illness*, perhaps because they do not know the Cause of it.

THE second kind of *Panaris* is a small Tumor, which has a great Affinity with the *Phlegmon*: It is to be found in the Fat that lies immediately under the Skin, and its Accidents are more dangerous, as the *Phlegmon* is nearer the Tendon.

THE third Kind of *Panaris* lies in the Tegument of the Tendon. That Disease discovers it self generally, like others, by a Tumor; but sometimes there appears no Tumor, as I shall shew hereafter. It is more dangerous than the two former, and its Accidents are extremely violent.

LASTLY, the fourth kind of *Panaris* differs from the others, because there appears neither Tumor nor Inflammation: nay, the Skin which covers the Illness does not change its Colour, and the Morbifick Matter lies between the *Periosteum* and the Bone. The Pain it occasions is excessive.

Those different Abscesses proceed from external and internal Causes.

The external Causes of the *Panaris*, are the Introduction of a Thorn or Splinter of Wood; the plucking off those Excrescences, that grow about the Nails, and are vulgarly called *Envies*; Contusions or Bruisings, violent Tensions; lastly, the Prickings of all sorts of pointed Instruments: Hence it is that Women, who work with the Needle, are more subject to the *Panaris*; but then they prevent it by sucking their Finger immediately; wherein they imitate the Suckers of Wounds, or those that cure by Suction, because by that means they draw the Blood that comes out of the small Vessels, and so prevent the gathering of Matter, and consequently an Abscess.

If we enquire into the internal Cause of the *Panaris* among the Antients, they will tell us that it is an adust, bad and corrupt Blood, which Nature expels from the nobler Parts towards the Extremities, by ways not easily conceivable.

On the contrary, among the Moderns, some say the *Panaris* is occasioned by the Corruption and Fermentation of the bilious and sulphurous Particles of the Blood. Others, that it is occasioned by an acrimonious Humour, which corroding the *Periosteum*, the Extremities of the nervous Filaments, and the Flesh, produces a scabby Crust. Lastly, others will have the Cause of it to be an extraneous Acid, which mixing with the alimentary Juice, that diffuses it self between the Fibres, the Membranes, and the small Vessels of the Extremities of the Fingers, occasions a Fermentation, which produces the Tumor, the Inflammation, the Pulsation, &c.

It were needless to confute the Opinion of the Antients. Many Learned Authors have rejected those unknown ways, which were said to convey the ill Humours from the noble Parts to the Extremities, and the perfect Knowledge we have of Anatomy, and the Circulation of the Fluids, shews the Falsity of that singular Foresight of Nature, which the Antients, through Ignorance, had recourse to.

As for the Opinion of the Moderns, it may be said, with respect to their first Opinion, that the Effervescence of the bilious and sulphurous Particles of the Blood, is nothing but a Fermentation of those same Particles; and according to that System the Tumor of the *Panaris* should be very painful, from its very beginning, which is contrary to Experience. Besides, the Favourers of that Opinion say only that the Cause of the *Panaris* is an Agitation of the bilious and sulphurous Particles of the Blood, without telling us how those Particles come to be divided and agitated rather in the Finger than in the other Parts of the Body; for the Blood being the same every where, something must needs put into Motion those bilious and sulphurous Particles; and that very thing is the first Original Cause of the *Panaris*; and the Fermentation of the Blood is only an Effect of it, as I shall shew hereafter.

IN Answer to the second Opinion, it may be said, that if the Humor, which occasions the *Panaris*, was from the beginning as corrosive and acrimonious as it is pretended to be, the Pain would immediately be very great; which is not true. Besides, we should have been told from whence that Humour proceeds, and what is the Cause of its Acrimony.

Lastly, if an extraneous Acid should mix with the alimentary Juice, and occasion an Effervescence, attended

tended with an Inflammation and Pulsation, the Pain could not be small at first, since, according to the mechanical Structure of the Finger, the Fluid cannot be agitated in those Parts which I have described, without occasioning, at that very Moment, a great Distention, and violent Pains: But we see no such thing at the beginning of the *Panaris*.

As for me, I acknowledge no other internal Causes of the *Panaris*, but the Pox, the Scurvy, or the King's Evil; and I never saw any *Panaris* but what either proceeded from some external Cause, or was an Accident of the Diseases just now mentioned.

EVERY Body knows that the Lymph of those sorts of Patients is so thick, that it stops and accumulates, in several Places, grows thicker and thicker, and occasions different Diseases. If it be in the Articulations, where there is naturally a clammy Lymph, which we call *Sinovia*, it occasions there intolerable Pains, Nodus's, gummy Tumors, sometimes Abscesses, and a thousand such Accidents. If it stops rather in the Tendons, and under the Membrane of the Muscles, it will compress the small capillary Vessels creeping in those Places, and be the Cause of an Inflammation, which distending the Membrane of the Muscle and the Tendon, will occasion those Pains which we call rheumatismal. If it stops in the Glands, it will obstruct and swell them, and occasion incysted Tumors, which will be different, according to the different Motion of the Fermentation: Or the Humour will gather into Imposthumes, and produce Abscesses, or cancerous Ulcers. Lastly, if it stops in the Finger, whether by reason of its particular Structure, or because there is already *Sinovia* in it, and many Lymphatics, it will compress the

small Blood-vessels, occasion a *Phlegmon*, &c. an Abscess, and a *Panaris*, as I am going to shew.

ALL the external Causes of the *Panaris* act likewise by thickening the Blood; for at first a Bruise, a Pricking, and all the other Causes produce a small Inflammation, which is not very often minded; and that Inflammation spreading into many small Threads, which from the Skin go through the Fat, and even to the Bones, reaching beyond the inclosing Membrane, compress the lymphatick Vessels, thicken the Lymph by dissipating its Serosity with their Heat, and occasion the Accidents which I am going to describe.

THOUGH I have said above, that all the Parts of the Finger are extremely sensible, yet the Patient will feel no great Pain at the beginning of the *Panaris*, because that Lymph gathering only by degrees, the Distention and Divulsion of the Fibres will be made also by degrees, and consequently the Reflux of the Spirits will not be violent, or the Pain extraordinary.

BUT because the Structure of the Finger is very singular, and it consists altogether of Parts very susceptible of Agitation; 'tis plain that Tranquillity will not last long, and will be attended with very sad Symptoms. For because that Lymph accumulates to such a degree, that it compresses the Veins very much, and because those Vessels cannot receive the Blood as it is conveyed by the Arteries, the Blood of the Arteries will not move in a straight Line, but get into a Million of small Branches that come from the two Arteries of the Finger, as I have said, to reach the Skin, and consequently it will grow red more and more.

LASTLY, the small Branches not being able to receive

ceive all the Blood of the two Arteries, and give it a free Passage, that Blood accumulating will distend them to such a degree, that it will break some, and extravasate; which cannot happen, without giving a lively red Colour to the Part.

BUT because those Accidents are more obvious in the two first Kinds of *Panaris*, since the Disease is only covered with the Skin, or one of its Parts; and because that Membrane yields much more than the Membrane of the Tendons, and the *Periosteum*, which lie underneath, it follows that in the two first Kinds of *Panaris*, the Tumor will be considerable, but in the second Kind it will lie deeper in the Articulations, because there is hardly any Fat, and because the Skin is there supported by Ligaments which proceed from the Bones; and therefore the Pain of the second Kind of *Panaris* will be sharper than that of the first, especially considering, that in this sort of *Panaris*, the Texture of the Skin is not distended. And because the Fever is a Consequence of the Pain, 'tis plain the first Kind of *Panaris* will not be attended with it; but there will be some Fever in the second.

THE Pain, that is felt in the Part, draws unto it a greater Quantity of Spirits, and therefore those Spirits, mixing with the Blood that is stopped, will agitate and ferment it very much. That great Heat, and extraordinary Fermentation, will agitate and ferment the thick Lymph to be found in the Part: Therefore, the Blood and the Lymph will suppurate and produce an Abscess, as it generally happens in the *Panaris*.

BUT if all those several Alterations are made in the Membrane of the Tendon, the Pain will be very violent, and attended with a strong Pulsation, be-

cause the Course of the Blood being almost wholly interrupted in that Part, every time the Heart conveys new Blood, it must needs keep asunder the Coats of the Arteries, since it cannot go forwards by reason of the Compression, and consequently it must increase the Pain by increasing the Distention. That Increase of Pain must therefore answer the Contractions of the Heart, and this is what we call a pulsative Pain.

BUT because the Membrane of the Flexors is almost cartilaginous, and does not yield to the great Fermentation of the diffused Matters, the Tendons of the *Sublimis* and *Profundus* will bear alone the Action of the gross Salts of the diffused Matters, and be very much irritated by them. And because those Parts are very much distended by reason of their continual Contraction; it is plain they can receive a great Motion, impart it to the Spirits contained in them, and occasion a violent Reflux towards the Brain, which will immediately be attended with the Return of the Spirits towards the Part; and consequently they will excite very great Pains, which generally occasion Insomnies, violent Fevers, Convulsions and *Deliriums*.

IF the Heat and Inflammation are as great as I suppose them to be, they must needs waste all the serous Parts of the Lymph, which has occasioned that Disease, that which has been accumulated since, and the *Sinovia*, which is contained all along the Inside of the Sheath. Those Fluids having lost their serous Parts, will be thicker, and being, as it were, concocted by a violent Heat, they will be hard and clotted, as appears by opening that sort of *Panaris*.

LASTLY, the Pains increasing continually by reason of the Irritations, which grow by Degrees excessive, 'tis plain the Return of the Spirits towards the Part will increase, be more frequent, and get into the adjacent Parts with great Violence. The adjacent Parts of the Finger being most of them Tendons, Membranes, Aponeuroses, and nervous Threads, their Fibres will be full of them, and will occasion a strong Compression upon the lymphatick and Blood-vessels, which creep in the Interstices. Those Liquids will diffuse themselves, ferment, and occasion a very great Inflammation in the Hand, in the fore-Arm, and in the Arm, even as far as the Shoulder: And the Inflammation dissolving the Fat, to be found in Bundles, in several Parts of the Extremity, will produce those Abscesses, called Abscesses with *Sinus's*. Therefore, in the third sort of *Panaris* there will be afterwards an Abscess, not only all along the Sheath of the Tendon, but also under the annulary Ligament, between the *Quadratus* and the *Profundus*, where a Bundle of Fat is seen, in the Interstice of many Muscles of the fore-Arm, in the Fold of the Elbow, lastly, as far as the Arm-pit.

ALL the Accidents just now mentioned will happen in the fourth sort of *Panaris*, excepting the Abscesses with *Sinus's*, and the Inflammation of the adjacent Parts of the Disease; and they will be the more violent, because the Lymph, which is the Cause of the Disease, is diffused between the Bone and the *Periosteum*, which is a Membrane very much distended upon its Surface, and consequently susceptible of a trembling Motion; and as it is intimately fastened to the Bones, by an infinite Number of small nervous and tendinous Threads, if it happens to be never so little inflamed, that Inflammation must

needs create such violent Pains, that the saddest Symptoms, arising from Pain, will follow thereupon.

HAVING examined the different Causes of the *Panaris*, both internal and external, let us proceed to the Signs which denote the different Kinds of that Disease. A Surgeon knows the first Kind of *Panaris*, when the Tumor is very much raised, when the Matter, that occasions the Disease, may be seen, because the *Epidermis* that covers it, is a transparent Membrane, when the Pain is not intolerable, and does not reach beyond the Finger, when there is no Fever, and the other Signs above mentioned do not appear.

THE second Kind is attended with the same Symptoms; but they are more violent, and there happens a little Fever, the Heat and Inflammation are considerable; and there is a Numbness in the whole Hand, with Pains and Prickings all along the internal Part, which sometimes reach as far as the fore-Arm; and those Pains are often attended with want of Sleep, especially when the Patient is of a slender Complexion.

ONE may know the third sort of the *Panaris* by a small Tumor, which frequently appears at the Finger's End. Sometimes there is no Tumor, as when the morbid Matter lies in Articulations, because the inclosing Membrane is there fastened by small Bridles, which hinder it from yielding. But the Pains are intolerable, and the Patient feels them in all his Fingers, if the Disease happens to be in one of the four Flexors. The same Pains are felt all along the Hand, in the Wrist, towards the annular Ligament, where they are very violent, and all along the fore-Arm, as far as the internal *Condylus* of the *Humerus*, which is the Origin of the *Sublimis* and *Profundus*.

mus. Sometimes those Pains reach no farther; but the Inflammation of those Muscles being communicated to the proper Membranes of the brachial and anterior Muscles, the Biceps, and the Flexors of the fore-Arm; the Pains reach to the Arm, the Arm-pit, and the Shoulder.

THOSE Pains always occasion a burning Fever, and commonly want of Sleep, Convulsions, and *Deliriums*. If the Matter causes Abscesses with *Sinus's*, the Tumor is not considerable all along the Finger, because the inclosing Membrane is very hard, and does not expand much; however, one may perceive small Tumors in the Interval of the Articulations. The Tumor is very considerable in the Hand; but the Pains are not so sharp. Lastly, the whole Hand, the Fore-arm, and the Arm swell very much; and in some of those Diseases, I have seen the Arm as big as the Thigh.

THE fourth Kind of *Panaris* may be known by a most violent Pain at the Finger's End, in the last Phalanx, and sometimes in the others, and by a very great Fever, want of Sleep, and frequent *Deliriums* and Convulsions. That fourth Kind of *Panaris* is further known, because notwithstanding all those Accidents, there appears no Tumor nor Inflammation, and the Patient feels no Pain in the internal *Condylus* of the *Humerus*.

THE Prognostick of the *Panaris* is more or less dangerous, according to its different Kinds. The first Kind is not at all dangerous; only if that Disease surrounds the Nail, it generally falls; and if it surrounds but one Part of the Nail, that Part only will fall, for the mechanical Reasons of the Formation and Growth of the Nail. And if

the Matter is contained under the Nail, that Kind of *Panaris*, though very simple, occasions very great and dangerous Pains, because the Nail cannot yield to the continual Afflux of Matter, and its Fermentation. This is the best Account that can be given, why a Pricking under hard Bodies, such as the Nails, under the Hoofs of Horses, under the *Aponeuroses*, under the Sheaths of Tendons, &c. is more dangerous than any other.

THE second Kind of *Panaris* proves generally more dangerous than the first, because it is contained under the Skin, whose Contexture is very close, and consequently making a greater Resistance, it occasions more violent Pains, attended with a considerable Fever, in People of a weak Constitution.

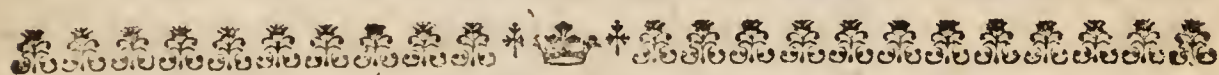
THAT Disease, as well as the two following Kinds, is still more dangerous in People of a dry and bilious Constitution, because their Fibres being drier, are more distended, and consequently more able to receive a strong Impression, and to be more violently shaken.

The Prognostick of the third Kind of *Panaris* is much more dangerous than that of the two first, because the Pains are much sharper, and the Fever so violent, that all the Accidents of that Disease appear in their Height, and frequently occasion the Death of the Patient. Besides, that Kind of *Panaris* is extremely dangerous, because it is often attended with the Gangreen, especially when the Blood is saline and vitiated; for the Pains of the Tendons being very sharp, and the Spirits flowing into them in great plenty, if the Blood that is stopped in them be saline, it produces an *Erysipelas*; and its corrosive Salts being very much agitated, by the great Quantity of Spirits mixed with them, corrode and tear all the
Fibres

Fibres of the Part, and so occasion a Gangreen.

ALL the different Abscesses, which attend that Disease, as I have said above, must needs afford a very dangerous Prognostick. When a Surgeon is sent for to see a *Panaris* of the third Kind, wherein he finds an Abscess with *Sinus's*, and an Abscess upon the *Quadratus*; he must tell the Patient, in the Presence of Witnesses, that the Operation is the only Way of curing him, but that he will lose the Use of his Finger, lest he should be blamed for it.

LASTLY, the Prognostick of the first Kind is not less dangerous than the foregoing, since the Pains are so excessive, and the Accidents so violent, that the Patient would quickly die, if he was not speedily relieved. Besides, the Bones are frequently rotten in that Disease; and if it be the last Phalanx, as it is very thin, it generally falls off during the Dressings, &c.



CHAP. XLVI.

Of the Operation and Cure of all Kinds of Panaris.

THE first Kind of *Panaris* to be cured is very inconsiderable, and requires no great Attention. Surgeons are very subject to it, because they are frequently obliged to fasten Pins upon wet Compresses and Fillets, grown stiff with the Fluids they are often imbibed with, and the Pins making a great Resistance to the Finger that drives them in, their Head bruises the small Vessels on which it leans; and there happens quickly a small *Phlogosis*, which occasions that Kind of *Panaris*. As soon as the Surgeon

Surgeon perceives some Matter, or Serosity, he must compress the Tumour gently on the Sides, thereby to brace the *Epidermis*; and with a Launcet he makes a small Incision in that Membrane. The Liquid comes out immediately; and the Skin, which must not be removed, quickly dries up, and consequently the Disease is easily cured.

IF the *Panaris* was in the external Part of the Finger, at the Root of the Nail, the latter will fall off, either wholly or in part, and as the Nail grows loose, and comes off, it grows black; and because the new one pushes it still forwards, either Whole, or the Part that remains of it, it must be pared now and then.

It happens sometimes, either by a pricking, or otherwise, that the Matter is contained under the Nail; and though the *Panaris* be of the first Kind, it would prove very dangerous, if it was not remedied; for the *Pus* would corrode as far as the Extensor of the Finger, and occasion great Inflammation, and Pains that would be communicated to the external *Condylus* of the *Humerus*, from whence the Extensors of the Fingers take their Origin.

To avoid these Disorders, the Surgeon must cut that Part of the Nail, which covers the Matter that corrodes it with difficulty, and having taken it off, he puts in the room of it some Lint dipt in Brandy, lest the Unequalities of the Nail should hurt the live Flesh, which is very sensible.

THE second Kind of *Panaris* being generally attended with a small Fever, and because People of a weak, or dry and bilious Constitution, run a great Hazard, the Surgeon must blood the Patient plentifully, and prescribe softening Remedies, and all those that can allay the great Agitation of the Blood.

THE Surgeon generally feels, in a little time, a small Fluctuation; and the best Remedy would then be to open the Tumor, in order to let out the Matter, and prevent its further Accumulation, because those *Phlegmons* make always a great Havock, as they come near the Sheaths of the Tendons. But as soon as a Surgeon proposes that Operation to the Patients, they send for Quacks, being prepossessed in favour of their Remedies. Those Men, without Learning and Principles, apply a Plaister, of which they pretend to have invented the Composition, and make a great Mystery of it: And because the Tumor does frequently break in twelve Hours, that mysterious Plaister, which they use for all sorts of Diseases, seems to triumph over Surgery.

WHEN therefore the Patients are against the Operation, which is the safest and most speedy way, the Surgeon must use Remedies proper to encrease the Suppuration, and open the Abscess. This will be effected by the Plaister of *Diachilum* with Gums, or such other Remedies.

ASOON as the Tumor is opened, he enlarges the Opening with Scissars, and dresses it with some melted Balm of *Arceus*, into which he puts a little Brandy, and lays over it a Plaister of *Diachilum*, &c.

WHEN the Surgeon has observed all, or some of the Accidents, which attend the third Kind of *Panaris*, he perceives sometimes a small Tumor at the Finger's End, wherein he feels a Fluctuation. He must then make an Incision all along that Tumor, with a strait *Bistouri*, as far as the Sheaths of the *Sublimis* and *Profundus*. Through that Opening there comes out a serous Matter; and by that Evacuation the Patient is immediately eased. He fancies

cies he is cured; but soon after, the same Accidents appear again, the Patient is in great Pain, and the Surgeon is frequently ignorant of the Causes of those sad Symptoms. Sometimes the Matter having corroded the Extremity of the Sheath of the Tendons, and the Texture of the Skin, it opens a Passage, whereby the Patient is eased for a Moment; but soon after, the Accidents begin anew; and the Surgeon perceives in that Part, where the Matter came out, a small Piece of Flesh, like a *Caruncula*, which is extremely sensible, and continually imbibed with a Moisture, that comes from a superior Part.

THE Surgeon must then introduce a grooved Probe into the Sheath of the Tendon, either through the Opening which he has made, or through the Opening occasioned by the Serosity it self, and drive it beyond the first Bridle. Afterwards, he must cut with Scissars, or with a *Bistouri*, what is contained under the Probe, and he will find, at the Opening, a clotted and thick Matter.

BUT if the Disease reaches farther, he must still drive the grooved Probe all along the *Sinus* of the Abscess, and cut what will be uppermost, till he has discovered the Seat of the Disease.

IF the Seat of the Abscess be in the Middle of the Sheath, and the Surgeon has dilated the Opening as far as the Middle of the first Phalanx; Mr. *Petit* advises one to carry on the Incision three or four Lines into the Hand, to avoid the Constriction occasioned by the remaining Part of the Sheath, which is cartilaginous all along the Finger, and which being only-membranous in the Hand, cannot be the Cause of that Accident.

LASTLY, if the Disease lies all along the membranous Sheath of the Tendons of the Hand, and even reaches

reaches under the annulary Ligament, to form an Abscess upon the *Quadratus*, where, as I have said, there is generally a Bundle of Fat, the Surgeon must always convey the grooved Probe all along the *Sinus* of the Abscess, and cut, till he comes to the annulary Ligament. There he bends a little the Fingers of the Patient, to relax all those Parts, and endeavours to drive the Probe under the annulary Ligament; and upon its Extremity, which raises the Skin, he makes an Incision only in the Skin; he divides the Tendons and Muscles, as nicely as he can, and falls all of a sudden into an Abscess, out of which there comes sometimes above half a Surgeon's Porringer of Matter.

WHEN the Surgeon is so lucky as to be able to convey the Probe under the annulary Ligament, Mr. *Thibaut* advises one to convey also under it a Fillet or Rowel, which being instead of a *Seton*, will take off, in the following Dressings, the Lymph, which is grown corrosive by the Separation of its Principles; and by that means he will avoid cutting the annulary Ligament, which ought to be preserved as much as possible.

IF this Precaution proves useless, and the Patient is still tormented with great Pains, a Fever, and other dangerous Symptoms, Mr. *Petit* proposes an Expedient, which immediately removes the Accidents, and is a speedy Remedy. He advises then to draw the Tendon affected with the Disease above the annulary Ligament, and to cut it in its fleshy Part: which being done, all the Accidents vanish.

LASTLY, if the annulary Ligament it self is imbibed with *Pus*, that is the Cause of the Disease; if it be inflamed, and occasions violent Pains, it ought to be cut without any Hesitation; and the

Patient

Patient will quickly be eased. This has been practiced several Times by Mr. *Arnaud*.

I saw, in *September* 1713. a Servant of Mr. *Gillet*, Dean of the Attorneys of *Paris*, affected with a very dangerous Disease. A Thorn got into his little Finger. Not long after, there happened a considerable Inflammation, attended with great Pains. The Surgeon applied a Poultice, and blooded the Patient plentifully; and then there appeared a small Tumor, upon which Mr. *Poncelet* made an Incision three Inches long. One half of that Incision took up the fore and upper Part of the Finger, and the rest took up the external and lower Part of the Hand. The Patient was not cured by that Incision. He felt every Day new Pains, especially towards the internal *Condylus* of the *Humerus*, which is the Origin of the *Profundus*, whose Tendon had been pricked by the Thorn; and a great Abscess was formed in the whole fore-Arm, which was perceived by a small longitudinal Tumor in its lower and hinder Part. Mr. *Poncelet* made an Incision upon the Tumor and putting his Finger into the Opening, enlarged it with crooked Scissars. A great deal of thick Pus came out, and it proceeded in some measure from the upper Part of the fore-Arm. Afterwards, putting his Finger into the Wound, he sunk it into a Vacuity reaching to the Middle and fore-part of the fore-Arm, where he made a counter-Opening, into which he conveyed a Rowel, so that this *Seton* was between the *Cubitalis Internus*, the *Sublimis* and *Profundus*, the *Radialis Internus*, and the two Bones.

MR. *Poncelet* dressed that Patient every Day with the digestive Ointment, and the necessary Embrocations, changing the *Seton* every time; and ten Days after,

after, when the Ulcer did no longer suppurate, he took off the *Seton*. But the very next Day there happened so great an *Erysipelas* in the whole Arm, that it would have occasioned the Gangreen, if the Patient had not been speedily relieved by frequent Plebotomy, and the Rowel which was put in again for two or three Days. At last, he was perfectly cured in six Weeks time.

To resume our Operation, if after having opened the *Vagina* of the Tendons, as far as the annulary Ligament, there is so great an Impediment, that the Surgeon cannot convey the grooved Probe underneath, to get into the Abscess, which I suppose to be upon the *Quadratus*, he must use a particular Method, as will appear by the following Story.

Mr. *Arnaud* was sent for to consult with several Surgeons about a *Panaris*, which a Man had in his Thumb. The Surgeons had already opened the Tumor, and cut the Thenar almost all along. They told Mr. *Arnaud*, that clotted Matter was come out, like that which comes out of Boils; and because the Accidents, instead of ceasing, had very much increased, and the fore-Arm was very big and inflamed, they fancied there was no other Remedy but to cut off the Arm.

Mr. *Arnaud* reflecting upon the Structure of the Part, told them, that the Flexor of the Thumb has a peculiar Tendon, which attends its fleshy Body as far as its Origin; and that between the fleshy Body and the *Quadratus* there is a Bundle of Fat; so that the Inflammation being in the Tendon of the Flexor of the Thumb, and reaching as far as its Origin, it had, by its Heat, put into great Motion the Blood, which circulates in the Bundle of Fat, and dissipated the Serosity of the Lymph of that Fat,

Fat, and the adjacent Parts. That those Fluids having lost their Serosity, it was plain their Salts were grown coarser, and consequently more capable of irritating those tendinous Parts; which had still increased their Inflammation, and the great Heat, which having melted that Piece of Fat, had occasioned an Abscess. So that in order to free the Patient from the Danger he was in, there was an absolute Necessity for cutting between the radial Artery, and the *Sublimis* and *Profundus*, and to look for the Abscess under the Flexor of the Thumb.

THE Surgeons, who had sent for Mr. *Arnaud*, refused to consent to an Operation unknown to them; and because upon such Occasions the Majority of Votes carries it, they left the Patient till the next Day. But perceiving the Disease to increase more and more, and having no Hopes of the Patient's Recovery, they sent again for Mr. *Arnaud*, who said, There was no other Way left but that he had proposed. The Surgeons consented to it at last; but because none of them would undertake the Operation, Mr. *Arnaud* performed it by dissecting, as I have said, and immediately fell into an Abscess, out of which came above a Porringer of Matter; and because the annulary Ligament made a considerable Constriction in all the Tendons that pass underneath, he did not scruple to cut it; and the Patient was presently eased; and the very next Day all the Accidents, which threatened him with Death, disappeared wholly. The Patient perfectly recovered by a careful Attendance, and with the Help of sweetning Juleps, Clysters, and a very regular Course of Diet.

Mr. *Petit* observes that the Hand must not be stretched out, when the annulary Ligament has been
cut;

cut; for in that Situation, all the Tendons come out of their places, and the Patient remains lame. On the contrary, the Hand must be shut, that the Ligament may be more easily reunited.

IN order to dress the *Panaris*, when the *Vagina* has been opened, the Surgeon uses long and dry Dozels, which he applies on both Sides of the Tendon, to preserve it; and he sufficiently raises them to make a Compression, that may prevent an Hemorrhagy; and if this Way is not sufficient, he uses the Ligature; for upon this Occasion Stipticks are dangerous.

THE Surgeon lays upon the Hand and the fore-Arm, maturative Poultices as warm as he can. He uses a Bandage with eighteen Heads, which is much more convenient than Rollers, because it answers the same Purposes; and besides, in order to apply it, there is no need of stirring the Part, or giving it any Motion.

Of the Bandage with eighteen Heads.

To make that Bandage, the Surgeon uses three Pieces of Linnen of the same Size, and of a figure almost square. In general, the Bandage *with eighteen Heads* ought to be somewhat shorter than the Part upon which it is applied, and twice as broad as it is thick. The Surgeon sows those three Pieces of Linnen together, in the Middle, length-wise. Afterwards he cuts the three Pieces sowed together, in two different Places on each Side of the Seam, taking care to leave all along the middle of those Pieces two whole Inches, I mean an Inch on each Side of the Seam. Those Cuttings, *viz.* two on each Side, and of an equal Distance, form eigh-

teen small Shreds, which is the Reason it has been called a Bandage *with eighteen Heads*. It is reckon'd among the compounded Ones.

THE Surgeon applies the Seam of that Bandage upon that Part of the Member, which is opposite to the Wounds that have been made, and covers the Dressing with the small Heads, beginning with that which he thinks fittest. But it ought to be observed, that whilst one of those Heads is conveyed with one Hand, the opposite Head must be held at the same time with the other Hand. Afterwards the Hand and the fore-Arm must be placed in a proper Situation.

WHAT remains, to make an End of the Cure of the several Sorts of *Panaris*, is only to discourse of the fourth Kind, the Pains whereof are so sharp and violent, that the Patient runs the risk of losing his Life, unless he is speedily relieved, by evacuating the Matter, which is the Cause of the Disease.

FOR the right performing of that Operation, the Patient's Finger is laid upon a Table; and some Servants hold his Arm, lest the Pain of the Incision should prompt him to pull it back.

AFTERWARDS the Surgeon takes a *Bistouri*, whose Blade is fastened with a Fillet, and he opens the lateral Part of the Finger, beginning with driving the Point of the Instrument to the Bone, and laying open the remaining Part of the Finger by sliding the *Bistouri*.

IF the Patient is not eased by that Opening, it is a Sign the Disease lies on the other Side of the Finger, where the same Operation ought to be performed. Sometimes a clear Water comes out in small Quantity, and frequently nothing at all; but when the Accidents disappear immediately, 'tis a plain Proof of the good Success of the Operation.

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THE Dressing is very simple ; but because that Disease happens more frequently to People affected with the King's-Evil than to others, it is not improper to enquire about it, and to give such Remedies as are adapted to the Constitution of the Blood in the different Diseases, that may occasion this.



CHAP. XLVII.

Of the Gangrene and Sphacelus in relation to Amputations.

THE Gangrene being one of the chief Reasons, that induce us to cut off a Limb, it is not improper to inquire into the Causes of that Disease, and to know the different Degrees; that we may prescribe the several Remedies proper for it, according to its Differences, and the Progress it makes in those Parts that are affected with it.

THE Gangrene in general is a Mortification of the soft Parts of the Body, and consequently a Loss of Sense, Motion, Heat, &c.

IF those Accidents are just beginning, I mean, if the Mortification is only in the Skin and Fat, and there remains still some Sense and Heat in the Part, it is then a Gangrene. But if that Disease has made a greater Progress; if the Body of the Muscle is almost rotten; if there is neither Sense, nor Heat, if the Part looks very black, and is grown soft; if the *Epidermis* comes off, and a kind of Slime is to be seen in it: Lastly, if there is an ill Smell, we call it a *Sphacelus*, or a perfect Mortification of the Part.

IF the Parts of the humane Body grow sensible, are nourished, and receive Heat only by the Spirits running into them, and by the Blood with which they are imbibed; it is plain the Corruption or Defect of those Fluids will make the Parts insensible, prevent their Nourishment, and deprive them of their natural Heat.

ACCORDING to this Notion, the Causes of a Gangrene are of two sorts. Some of them concern the Defects in the Fluids, which circulate in all the Parts, and others depend upon the Disorder of the Solids, which may happen several ways.

IN order to explain how the vitiated Fluids, that circulate in all the Parts of the Body, can produce a Gangrene, we must consider the good Effects arising from them, when they are in their natural State.

SINCE the different Parts of the Body are capable of feeling, only by reason of the Spirits, which come from the Brain, and running back again towards the Brain, give it notice, as it were, of all the Impressions that are made upon the Parts from whence they return; it follows, that when the Spirits are wanting in some Part, either because its Nerves are stopped by any Cause whatsoever, or because they are compressed by some adjacent Tumors, or because the Blood is disposed to produce Obstructions, the Part will grow insensible. This happens to People sick of the Palsy, &c.

BUT because Insensibility is only a Disposition to a Gangrene, and there is in that Disease a want of Heat, Nourishment, and Motion, it is plain that the Blood, which alone can afford Heat, &c. is no longer conveyed to the Part, or able to communicate any Heat to it.

A Gangrene frequently happens that way,
I

I mean, by the Interruption of the Blood, as I shall shew hereafter. But it likewise happens from the Corruption alone of that Fluid.

IN order to apprehend how the Corruption of the Blood in a Part can make it cold, and deprive it of its Motion, one must know how the Blood can heat the whole Body. Now the Blood communicates, to the several Parts, the Heat it derives from the Fermentation of the Principles of which it consists, and from the Motion of Pulsation, which the heart imparts to it, and which preserves the Fermentation. Therefore, if the Principles of the Blood be vitiated by any Cause whatsoever, and if they are no longer animated by the Spirits, that Fluid will lose, either wholly, or in part, its Motion of Fermentation and consequently its Heat.

THE Heart being the first Part, that experiences the sad Effects of the Disorder of the Principles of the Blood, its Piston-like Strokes will be weak, and at a great distance from one another; and consequently the Motion of Trusion growing very slow and keeping up no longer the Motion of Fermentation, the Particles of the Blood will be very little agitated: They will stick and be united together, in such a manner, as to form a *Coagulum*.

THE Causes, which can thus alter the Blood, and qualify it for a Gangrene, are 1. Repletion, sitting up late, violent Exercise, and the use of hot Aliments and Liquors. 2. Some Passions of the Mind, such as Sorrow and Trouble, hard Study, great Hemorrhagies, and the use of cold Aliments. *Lastly*, Old People afford us the third Cause.

To explain those *Phænomena*, I shall observe, that sitting up late, &c. having occasioned a great Agitation of the Blood, and a violent Fermentation of its

Principles, it necessarily follows, that its most subtle and watery Particles are evaporated, and that the remaining Salts becoming, by that Separation, very gross, and being very much intangled in the sulphurous Particles, have qualified the Blood for a Gangrene.

SECONDLY, Trouble, Sorrow, and hard Study, great Hemorrhagies, &c. giving a Consistence to the Blood, and fermenting it irregularly, and in a very particular manner, its Salts will change their Nature, according to their different Combinations, and will grow so corrosive, that they will be able to produce different Diseases, especially a Gangrene.

THIRDLY, Old People are very much subject to Gangrenes, because their Blood having undergone a long Fermentation, and repaired all the Dissipations, during the whole Course of their Life, it is at last deprived of those subtle and spirituous Particles, which produced the Motion of Fermentation; and its Salts become so much the grosser, as the Heart beating but weakly, occasions a closer Union of them. And therefore old People lose their Strength, and their natural Functions by degrees, because the Fibres of their Organs having acquired their last Degree of Extension, and lost insensibly their natural Suppleness, they lose, at the same time, their Elasticity, and a Gangrene happens.

A Gangrene, occasioned by the Defects of the Blood, does generally affect the Extremities; but it quickly reaches the whole Body, notwithstanding all the Remedies that can be used. If it appears in the Extremities sooner than in other Parts, it is because the progressive Motion, which the Heart communicates to the Blood, being very weak in such a disordered Constitution, becomes still more so before

it comes to the Extremities. This happens the more easily, because the several Parts it goes through, have lost almost their whole Elasticity, and are very flabby for want of Spirits; so that those Parts receiving a great deal of Motion from the Blood, and imparting none to it by reason of their Softness; it follows, that the farther the Blood is from the Center of its Motion of Pulsation, the less it will be agitated.

BUT if the Motion of Fermentation, to be found among the Principles of the Blood, is kept up by the Motion of Pulsation; it necessarily follows that the latter being very much lessened, as I have shewed, by an undeniable Mechanism, is no longer able to keep up the Motion of Fermentation; and consequently the Blood will have no Motion in the Extremities, or very little: So that the Principles of that Blood being no longer agitated all manner of ways, nor mixt, its Salts will be at liberty to strike together, and to form corrosive *Moleculæ*, which will tear and destroy the Texture of the Part, and so produce a Gangrene.

BESIDES the Defects of the Fluids, which circulate in all the Parts of the Body, I have said, that a Gangrene is frequently a Consequence of the Disorder of the Solids.

THAT Disorder happens several Ways. For Instance, the large Trunk of a Vessel may be cut with sharp Instruments, such as Scissars, Swords, Sabres, Axes, &c.

THE large Vessels may also be torn by Bails going through the Limbs, or by Splinters of Bones in a Fracture.

AN Ulcer lying near a large Vessel, when its *Pus* is serous and corrosive, may corrode it by degrees, open it, &c.

THE Disorder of the Solids is also occasioned by different Compressions; for the large Trunks of the Blood-vessels or Nerves, may be compressed in a Luxation by the Head of the Bone, that comes out of its Cavity, and makes a considerable Protuberance. All sorts of Vessels may also be compressed by adjacent Tumors, such as distended Glands, and *Scirrhus's*. The Ligatures of the Vessels are also sometimes attended with a Gangrene, as appears in the Operation of the Aneurism. The same may be said of Bandages too tight, as it happens sometimes in Fractures, especially when the Splinth has been used.

BESIDES all those Causes, the Tendons of the Muscles may also be constricted by their annular Ligaments, in consequence of some of their Diseases; and they may occasion so great a Disorder, that a Gangrene will ensue, as I have shewed at large, discoursing of the *Panaris*. The Muscles are liable to the same Accident in their fleshy Part, by the Inflammation of their own Membranes, or of the common *Aponeuroses* with which they are covered. And therefore Surgeons advise to make an Incision, which not only cuts the Skin, the Fat, and the *Aponeurosis*, but also opens the Membrane of the Muscle to set it at liberty.

LASTLY, the fatty Cells, being too much imbibed with Serosity, may be extraordinarily distended; which occasions a Ligature in those Places where the Skin is folded, as in the Fold of the Arm-pit, &c. This happens in a great *Oedema*, and in Dropsies. All those Accidents preventing the Blood from running into the Parts in a proportionable Quantity, or keeping the Blood and the Lymph in some Places, produce there different Gatherings of Matter, which are frequently attended with a Gangrene, though there be no Defect in the other Fluids. THE

THE diagnostic Signs of a Gangrene are sufficiently known by what I have said of it: However, because there are certain Signs, which denote its Causes or Degrees, I shall mention some of them. A Gangrene, occasioned by the Defects of the Fluids is known, because it is not commonly preceded by an Inflammation, or great Pains: the Parts grow flabby, and the Limb loses all Sense and Motion. The Patient has a lingring Pulse, and is subject to frequent Weaknesses.

A Gangrene, which attends the Disorder of the Solids, proceeding from many Causes, is also different; for that which is occasioned by the Opening of the large Trunks, begins without a gathering of Blood about the Vessels, or with such a gathering. If it arises from the first Cause, there being no Inflammation, the Accidents are much the same with those that follow a Gangrene occasioned by the Defects of the Liquids. But if there is a considerable Effusion, attended with an Inflammation, the Pains are violent (as I have said, speaking of the *Panaris*) the Colour of the Limb is very red, and the Heat extraordinary; so that a Gangrene will succeed all those Accidents, when the Pains are over; the Limb will be pale and purple, there will be some small Rising in the Skin, full of salt Water: the Part grows cold and flabby; the Impression of the Finger remains in it; and it loses all Sense and Motion. This may further happen (as I have said) in the Inflammation of the annular Ligaments, of the Tendons, and the fleshy Part of the Muscles.

IF a Gangrene succeeds the Interruption of the Spirits, as it happens upon the Compression of the Nerves and Blood-vessels, occasioned by some Luxations, by glandulous or scirrhus Tumors, by the
immediate

immediate Ligature of the Vessels, or by over tight Bandages; it is known by a Numness, which the Patient feels all along the remaining Part of the Extremity, and which is quickly attended with the Loss of Sense and Motion.

IF a Gangrene succeeds a great *Oedema*, or a Dropsy, because the fatty Cells being too much imbibed with Serosity, occasion Ligatures where the Skin does generally make Foldings, as in the Fold of the Arm-pit, &c. The Patient does not immediately feel a great Pain; but the Inflammation happens afterwards, and the Pains grow more violent.

LASTLY, the *Sphacelus* is known by a heavy Pain, and a considerable Weight in the Limb. Besides, there is a Distention in the adjacent Parts. For Instance, if it be the Leg, the Thigh will be distended; and if it be the Thigh, the Buttocks, the Loins, and frequently the Back will be distended and oedematous. If it be the Arm, the Distention will be in the Shoulder, &c.

THE Prognostic of a Gangrene in general is very dangerous, for since it is a Mortification of the afflicted Part, it is the most deplorable Condition it can be in.

A Gangrene is extremely dangerous, not only by reason of the Corruption of the Part, but also because it reaches the adjacent Parts, by communicating to them Salts, which coagulate and disorder the Blood about the gangrened Part; as appears by the Distention, commonly observed in the adjacent Parts of the Disease.

MOREOVER, a Gangrene is very dangerous, because it communicates Salts to the whole Mass of Blood, which ferment it irregularly, and produce many sad Accidents; for if the Blood is disposed

fed for a Gangrene, the leaft Part affected with that Corruption, is more than fufficient to infect all the others.

A Gangrene occafioned by the Depravation of the Fluids, which run through all Parts of the Body, is the moft difmal, efpecially in an Old Man, becaufe his Blood being deftitute of fpirituous Parts, and its Principles being no longer duly combined together, it is like a Mafs without Motion, very capable of Coagulation: And the Remedies, that are moft proper to animate the Blood, not being able to alter fuch a Blood; it follows that this Difcfe muft needs be mortal to People of fuch a Conftitution. This is daily confirmed by Experience; and I faw a Woman at the *Hotel-dieu*, affected with a Gangrene in her Foot, though no external Caufe, nor any Diforder in the Solids, could be alledged for it. Mr. *Thibaut* cut off her Leg; and immediately all the Veffels appeared full of a thick coagulated Blood: Not one Drop fell to the Ground, though the *Tourniquet* was wholly unbraced. The Surgeon dressed that Woman with Plagets dipt in Spirit of Wine camphered, and every two Hours ſhe had Cordial Potions given her to revive her Blood. All thofe Remedies proved of no Ufe. The next Day the ſame Surgeon cut off her Thigh; and the Blood appeared the ſame ſtill. At laſt ſhe died two Hours after.

THE Gangrene which proceeds from the Depravation of the Fluids, occafioned by fitting up late, by a Repletion, violent Exercise, and the Ufe of too hot Liquors, is not ſo dangerous as that, which is the Conſequence of Sorrow, hard Study, and the Ufe of too cold Aliments, becaufe in the latter Caſe, the Blood is worſe, and cannot be ſo well reſtored to its former Condition.

WHEN

WHEN a Gangrene is occasioned by the Disorder of the Solids; it is more or less dangerous, according to its different Degrees; for when that Disease is only a Gangrene properly so called, I mean, when it affects only the Skin, the Fat, and the Membrane of the Muscle, it is not so dangerous as when the Part is affected with a *Sphacelus*, since it may frequently be cured without proceeding to the last Remedy. But when the Body of the Muscle, or the Tendon, is gangrened, there is no other Remedy but Amputation.

WHEN a Gangrene happens in the Opening, or Ligature of the large Vessels, as it happens in Shot Wounds, or in an *Aneurism*, Amputation is the only Remedy left.

THE Gangrene, occasioned by a great Cold, which succeeds a great Inflammation and Contusion, is not very dangerous; for, its Cause lies only in the Part; and the Mass of Blood is not vitiated; so that it may be cured with proper Remedies.

LASTLY, That Gangrene, which happens upon scirrhous Tumors, distended Glands, Luxations, and Fractures, and is a Consequence of the Compression of the Vessels, as it happens to those who lie too long upon their Backs, I say, that Gangrene is more or less dangerous, as its Cause is more or less malignant.

Of the Cure of a Gangrene.

SINCE I have laid down two general Causes of a Gangrene, one that concerns the Depravation of the Fluids, and the other, the Disorder of the Solids, we must use those Remedies, that destroy the Causes, as much as can be done. The first will act
upon

upon the Blood to restore its natural Fluidity, and will be the most proper internal Remedies. The others will work upon the Part it self, to free it from extraneous Bodies, and will be external Remedies.

WE have already seen, that a Gangrene, occasioned by the Depravation of the Fluids, proceeds from many Causes, and that according to those Causes, the Blood and the Lymph are of a different Constitution; from whence it appears, that different Aliments or Remedies ought to be used. If the Blood and Lymph have been vitiated by sitting up late, &c. Aliments, that sweeten the Blood, and pass easily must be prescribed in order to restore it.

IF hard Study has impaired the Fluids, it is well known that the Humors of studious Men are thick, and do not circulate easily; and therefore Aliments and Remedies proper to put the Fluids into Motion ought to be prescribed to them.

IF a Gangrene attends a great Hemorrhagy, Weakness, and such other Symptoms, as may easily be foreseen, will be the Consequence of it; In order to remove such Symptoms, those Remedies that are moistening, light and very nourishing, are preferred to others; but they ought to be taken in small Quantities and often.

IF a Gangrene proceeds from a Repletion, Evacuations of several Kinds will correct it. Lastly, those who have taken Aliments either too cold, or too hot, will be eased by contrary Remedies.

EXTERNAL Remedies must also be adapted to the Causes of a Gangrene. For Instance, scorbutick People are sometimes subject to a dry Gangrene; and the anti-scorbutick Remedies are the best. If a Swelling, and a Distention have occasioned the Gangrene

Gangrene, emollient, and softening Remedies ought to be used preferably to all other; and because I suppose a Swelling, Phlebotomy will prove very useful in that Case.

IN order to make external Remedies effectual in most Sorts of Gangrenes, the Part must be opened with Incisions or Scarifications upon the whole Extent of that Disease.

THOSE Operations being performed according to the Method I shall propose hereafter, are attended with a speedy Success, and seem to work Wonders, by preserving the Life of a Limb, for these three essential Reasons. 1. Because they unbrace the Part, and set it at Liberty. 2. Because they expel the vitiated Juices, which are the Cause of the Disease. 3. Because they enable the Surgeon to apply the Remedies immediately to the Disease.

THE deep Incisions or Scarifications, that are made upon the Extent of a Gangrene, unbend the Part, and set it at Liberty, because they open the Skin, the Aponeuroses, which serve instead of common Membranes, and the Membranes peculiar to the Muscles, which by their extraordinary Distention choak up those Organs, and stop the Fluids in them.

THEY expel the coagulated Juices, not only because they open a free Passage for them, but also because they very much relax the different Vessels, and by that means facilitate the Reflux of the Spirits which the Brain affords, and the Blood which is continually impelled by the Heart; and those Fluids expelling from the Part those that are separated and corrupt, resume their usual Course, their Motion of Fermentation. Thirdly, They make way for the Remedies to reach the very Bottom of the

the Disease ; which is no small Advantage, since the spirituous Liquors that are made use of, irritate in that Place, all the small nervous Fibres, which were, if I may say so, buried under the coagulated Juices, that are the Cause of a Gangrene, and by those Irritations bring the Spirits plentifully into the Part ; whereby the Blood acquires a greater Motion, and consequently the Heat is very much encreased.

In order to make dexterously those Incisions or Scarifications, which I think so useful, the Surgeon takes a strait *Bistouri*, or one somewhat crooked. I should like the latter better than the other. He drives that Instrument as deep as he thinks fit, according to the Incision he designs to make, and then cuts the Skin and Fat about the Length of three or four Inches, in proportion to the Bigness of the affected Part. He must make several Incisions on the Side of the first, and in a Parallel Line ; by which means there will be a Row of longitudinal Incisions or Scarifications.

The second Row of Scarifications must begin about three or four Inches above the First ; and the Surgeon ought to contrive Matters so, that the lower Angle of each Incision may end between the two upper Angles of the two first Incisions, that they may all engage one with another.

If the Surgeon thinks fit to make a third or fourth Row of Incisions, he must always begin them above the last ; and if the first Incisions do not appear to him long enough, he enlarges them by the lower Angle of each Scarification.

If I begin those Operations with the lower Part of the gangrened Body, it is in order to prevent the Blood, that comes out, from disturbing the Surgeon in the second and third Row.

BESIDES

BESIDES those longitudinal Incisions, the Surgeon must also make transverse ones, especially in those Parts, that are bounded by the *Aponeuroses*, such as the external and hinder Part of the Thigh and Leg, the external and hinder Part of the fore-Arm, and along the Back and Loins.

THESE transverse Incisions have a speedy Success, because they cut all manner of Ways the aponeurotic and membranous Fibres, which bind too tight the Muscles wherewith they are covered, and by that Means facilitate the Circulation of the Blood and Spirits.

WHEN the Part is thus relaxed by Incisions, and the thick Juices, which are the Cause of the Disease, have a free Passage, the whole Limb ought to be fomented with hot and spirituous Liquors, to revive the Spirits. Such are warm Wine mixed with Brandy, camphered Brandy, &c. Spirit of Wine camphered or heightened with Salt Armoniac, is an excellent Remedy; and it has often revived the Flesh, which seemed to be quite dead. It has that good Effect, by entangling with its sulphurous Particles the coarse Salts, which dissolve the Part; for the same thing must happen by the Mixture of Brandy with the corrosive Salts of the Gangrene, as by its Mixture with the Spirits of Nitre, Salt, and the *Lapis Infernalis*. And because it wonderfully softens the latter, and hinders them from making upon the Body the violent Impressions which they made before the Mixture; it ought likewise to be inferred, that mixing with the corrosive Salts of the Gangrene, it intangles them by its pliant Filaments, and makes their Surface even, which was before uneven. Besides, one may very well believe that Brandy, by its acid Volatil Particles, with the acrimonious Salts, breaks them, lessens their Bulk,

and

consequently disables them from working upon and dissolving the solid Parts. We infer, that Brandy works in such a Manner, because it has been observed, that the Blood was coagulated before the Application of Brandy, and that it was dissolved, and resumed its former Fluidity, after the Application of that Liquor, which necessarily supposes a new Fermentation.

CAMPHIRE, or armoniac Salt, added to Brandy, contains volatile Salts, which irritate the small nervous Fibres, laid open by the Incisions, whereby the Spirits run into the Part in a greater Quantity: The Spirits mixing with the coagulated Blood, divide and put it into Motion, and by that Means occasion a Separation of the dead Part from the sound.

WHEN the afflicted Part has been fomented with all those Remedies, the Surgeon applies upon it resolute Poultices, which must not be taken off every Hour, nor every four Hours; but they ought to be moistened with the Fomentations that have been used; and the Patient must be dressed at most once in four and twenty Hours, unless it appears that the Gangrene makes any Progress, which will be known by a concentrated Pulse, a Disposition to a *Delirium*, and by a wild Look and sparkling Eyes.

BUT if, notwithstanding all those Remedies, the Part grows more insensible, colder, and softer, and it appears that the Gangrene is in the Body of the Muscles, Remedies can no longer be depended upon; 'tis a dead Part, and Amputation is the only Way left to save the Patient's Life.



C H A P. XLVIII.

Of the Amputation of the Leg.

BESIDES all the Causes of a Gangrene, which I have mentioned in the foregoing Chapter, there happens also so great a Disorder in the Solids, that it cannot be removed but by the Amputation of the Limbs.

Those Disorders are, great Fractures of Bones, an incurable Caries, enormous Exostoses in the Articulations, and Fistulas in those same Parts, which could not be cured by the most proper Remedies.

THE Fractures of Bones happen several Ways, either from the Blows of many Sorts of Instruments, or by Falls; but a Limb ought not to be cut off by Reason of those Accidents, unless a very skilful Surgeon be fully persuaded, that the Disease cannot be removed any other Way. He must therefore thoroughly examine the Nature of a Wound complicated with a Fracture. If the *Tibia*, for Instance, is broken into several Pieces, if the Splinters are sunk into the Muscles and Tendons, if they prick some Nerves or Blood-Vessels, the Want of which may occasion a Gangrene; *lastly*, if they cannot be restored to their natural Place; 'tis plain that a Wound of such a Nature can only be cured by cutting off the Leg.

BUT if there was, for Instance, a Wound complicated with a Fracture in the middle Part of the *Tibia*; if that Bone is broke obliquely, and if even, there is a small Notch in its hinder Part, occasioned by the Fracture, I ask whether the Leg ought to be cut off?

IF

IF we believe some Surgeons, whose whole Learning consists in the Dressings, who are not able to reflect upon the Structure of the Part, who have not a sufficient Genius to find out new Ways of curing Diseases in difficult Cases, and judge of the Dexterity with which some dress certain Fractures, only by the Effects, without enquiring into the Causes of the ill Consequences, which sometimes happen; I say, if we believe those Surgeons, we shall quickly cut off that Leg.

BUT if we consult those learned Surgeons, who have frequently demonstrated all the Springs of the human Machine, they will tell us, that Bones may be reunited, as well as the other Parts, and that there are only two essential Things requisite for that Reunion: The first consists in keeping the two Pieces of a Bone one against the other; the second requires a good Constitution in the Patient, and a perfect Willingness to be ruled by the Surgeon.

BUT if the Fracture is such, that the two Ends of the broken Bone cannot remain against one another, like that which I have instanced, by Reason of the small Notch, which I suppose to be in the hinder Part of the Bone; Mr. *Petit*, in such a Case, made a Hole in the Fore-part of each End of the Bone, and put a small Ivory Blade upon the two Bones brought near one another, and kept them so, with the Help of two small silver Screws. By that Means he imitated, with respect to the Bones, the quilted Suture, which is commonly made in the transversal and deep Wounds of the great Muscles. He ordered the Patient to take nothing but Broth every three Hours, and not to stir in his Bed; but the Patient did not mind that Prescription; for when the Surgeon thought he observed a regular

I 1 2

Diet,

Diet, he eat a great deal of Soop and Meat, and drank Wine ; which occasioned a gathering of Matter all along the Leg and Thigh, which so disordered the Constitution of his Blood, that it could not afford a glewy Juice to form a well-conditioned *Callus*.

I must farther add, that the Patient was always stirring, and continually displaced the two Pieces of Bone, which were kept together with the Help of the Ivory Blade and the small silver Screws.

If it be absolutely necessary, in order to form a *Callus*, that the two Ends of the broken Bone be set against one another, and that the Patient should observe a very regular Diet ; one may very well believe, that this Patient was far from being cured : However, that Method, which is very ingenious, ought not to be laid aside, in order to resolve upon the Amputation, which is frequently the Refuge of Ignorance. And, indeed, is it not more glorious to dress a Patient half a Year, and preserve all his Limbs, than to deprive him of one of his Members, that he may be cured in six Weeks ?

THE Amputation of the Leg is more perplexing than difficult ; it is perplexing, because the *Apparatus* proper for it is great, and because it requires a great deal of Attention, and a great Presence of Mind. To avoid failing in any Circumstance of that Operation, our Authors advise the Surgeon to send for an able Man, who will put him in Mind of many Things which he might forget, for Want of sufficient Attention ; for it is much better that a Surgeon should share with another the Honour of an Operation, than if he should perform it wrong alone.

BEFORE the Operator proceeds farther, he must dispose

dispose the Dressing, and set it upon a large Dish. He lays, first of all, upon that Dish, what will be used last; wherefore he begins with three or four Compresses, two Inches broad, and about a Foot and a half long; which is the Reason why they are called *Longuettes*.

THOSE Compresses being crucially laid upon the Dish, are afterwards covered with a Compress of a suitable Size, and cut in the Shape of a *Malta* Cross. Above that Compress the Surgeon lays a small square one, and above the latter he commonly lays a large Plaget of Flax dipt in a Liniment made with Whites of Eggs, *Oleum Rosatum*, and a little Vinegar; he strows that Plaget with *Bole Armeniac*, or *Colophony*; but I shall not use those Ingredients; and instead of the flaxen Plaget, I prescribe, a large Lint-Plaget of a round Figure; for some Reasons which I shall mention hereafter.

ON the Side of that large Plaget, the Surgeon lays two small ones, of a round Figure; one of them, which is very little, is put upon the *Perone*, and the other, which is larger, is applied upon the *Tibia*: Afterwards the Surgeon lays near those Plagets a small Compress, thick enough to press hard upon the Vessels upon which it is applied; and it must not be above an Inch broad, that it may be placed between the two Bones. He must not forget to put upon that Dressing, Buttons made with *Vi-triol* pulverized, surrounded with Cotton, and two or three Dozels and square Compresses to lay them, upon Occasion, on the Vessels, that are too small to admit of a Ligature; *lastly*, the Surgeon puts upon the Dish two Lifts of a suitable Length and Breadth, as I shall say hereafter; one of which must be rolled with one Head and the other with two.

It will not be improper to have another Dish, and to lay upon it the Instruments proper for that Operation, such as a thick Compress two or three Inches broad, and five or six Inches long, to compress the Vessels, that the Surgeon may secure the Blood during the Operation; another circular Compress to fasten the first; the Noose which ought to belong enough to be laid folded on double; the *Tourniquet*, which is commonly a small Box Stick, like a *Bilboquet*, which is a small Stick upon which Periwig-makers curl the Hair, only with this Difference, that it is two or three Times bigger. A small round Piece of Horn, Pasteboard, or Leather, to put under the *Tourniquet*: Another Noose to keep the Flesh tight; a crooked Knife; a small strait Knife, not above an Inch broad, only with one Edge; crooked Needles, threaded with Fillets, like those I have described, speaking of Sutures: Scissors; a Razor; and many other Things; according to the different Operators.

ALL those Circumstances being duly observed, the Patient must be placed upon an easy Chair; or upon the Edge of his Bed half bent, and supported in that Situation by a Servant, who shall be upon the Bed, and behind the Patient; two other Servants shall support the Limb that is to be cut off; the first being on the external Side of the Thigh, shall hold up the Limb with both Hands towards the Knee; the second, being over-against the Patient, upon one of his Knees, shall support the lower Part of the Leg, in a Line parallel to the Thigh; *lastly*, a fourth Servant shall give the Instruments to the Operator.

WHEN the Surgeon has well prepared the *Apparatus*, placed the Patient conveniently, and the

Servants

Servants in a proper Station ; he must first of all shave the upper Part of the Leg, from the Knee to that Place where it must be cut off, which is generally under the Tuberosity of the *Tibia* ; I mean six Inches above the Knee. I shall shew hereafter the Usefulness of such a Precaution ; and if Surgeons are advised to cut off the Leg under the *Aponeurosis* of the Muscles, half nervous, and half membranous, and of the *Gracilis Internus* ; it is in order to avoid Convulsions, Inflammations, and long Suppurations, which have frequently happened after the Cutting off the *Aponeurosis* of those Muscles.

FOR the right performing of that Operation, the Surgeon ought to mind four essential Things : The first consists in preventing an Effusion of Blood during the Operation : The second, in preserving the Skin as much as possible : The third, in extirpating the Limb : The fourth, in securing the Blood after the Operation.

To put in Execution the first essential Thing, the Surgeon being placed between the Patient's Legs, and having a Napkin about him to wipe his Hands conveniently, shall take the small longitudinal Cushion, or the thick Compress above described, and place it under the Ham, that being the Place where the Vessels pass, being only covered with a little Fat and the Skin. He must then take Care that the Leg be a little bent, that the Bones may not lie open, when it is cut off.

THE Surgeon must also take Care, that the Cushion, or Compress, be of a certain Figure, and that it may be conveniently laid between the Tendons of the Inflexors of the Leg. Those Muscles, on the external Side, are the *Biceps*, which is inserted in the upper and external Part of the *Perone* ;

and, on the internal Side, the half nervous and membranous, and the *Gracilis Internus*, which are inserted inwardly in the upper Part of the *Tibia*, under its Tuberosity by a common *Aponeurosis*; for if that Cushion leaned upon those Tendons, they would be so much compressed, that the Lymph and Blood circulating in their Fibres, might extravasate, and occasion Inflammations, Gatherings of Matter, and Abscesses, whereby the Patient's Life would be in great Danger.

THE Surgeon must support that Cushion with a Compress long enough to make one Turn and a half about the Circumference of the lower Part of the Thigh. Afterwards, he shall lay over that Compress the double Noose, which must be stopped in the Fore-part of the Thigh, above the Knee, with a single Knot and a Loop; taking Care to leave a Space, in order to convey the round Piece of Horn, Pastboard, or Leather, and the *Tourniquet*, which must be braced, whilst the Surgeon cuts the Flesh and the Bones.

THE usual *Tourniquet*, which I have described, is liable to several Faults, that frequently prevent the Success of the Operation, by the Accidents which it occasions afterwards. *First*, it straitens equally the whole Circumference of the Limb, that is to be cut off, which hinders the Blood from running through the collateral Vessels, for the Nourishment of that Part, which ought to be preserved. *Secondly*, it pinches the Skin, because the Patient, affected with the Fear of the Operation, gives no Notice of it. *Thirdly*, it must be held by a Servant, who being ignorant of the Operator's Views, will straiten it too much or too little. I add, that a great Number of Servants is no small Obstacle in the Operation.

To prevent all those Accidents, the ingenious Mr. *Petit* invented a new *Tourniquet*, consisting of an Iron Plate, half circular, in the Middle of which there is a Button, on the Side of the Convexity, and spiral Grooves are contrived in that Button to receive a Screw. That Plate is covered with shammy Leather, excepting the Button; and at the two lower Ends there are two small Cushions, to avoid bruising the Sides of the Member.

To that Plate another is adapted, which is not half so large, and is pierced in the Middle, to let out the Button of the first.

AFTERWARDS the Surgeon uses a Cushion of rolled Linnen, covered with shammy, and tied to a Boot-Leather likewise covered with shammy; and behind he sows a Noose folded double, which makes at one of the Ends a Handle four Inches long, and at the other the two Extremities of the Noose hang down.

IN order to apply that *Tourniquet* well, the Surgeon puts the two Plates adapted together about the Thigh, and above the Knee, the Button being opposite to the Ham: Afterwards he applies the Cushion upon the Vessels, between the Tendons of the Inflexors, and conveys the Handle and Extremities of the Noose above the Plate, to stop them with a Knot and a Loop, and then with the Help of the Screw he removes the two Plates from one another; by which Means the Cushion is very much straitened, and consequently the Vessels are compressed. The Screw of that *Tourniquet* having too small Threads, Mr. *Petit* orders it to be made of Wood; so that half a Turn of the Screw is sufficient to make a great Compression.

THE Usefulness of that *Tourniquet* consists in several

veral Things: *First*, It is not troublesome when it is applied. *Secondly*, It may be kept on as much as one desires after the Operation. *Thirdly*, There is no need any Body should hold it; for the Operator may loosen or straiten it, as he pleases. *Fourthly*, It stops the Blood very well.

THE first essential Thing being done, the Surgeon stretches out the Patient's Leg, and bids a Servant draw the Skin over the Knee,, in order to preserve as much of it as possible, to cover the Stump. Afterwards he makes a Ligature with the second Noose, under the Tuberosity of the *Tibia*, in that Part where he designs to cut off the Leg, that he may the better consolidate the Flesh, and facilitate the Operation.

To perform the third essential Thing, which consists in the Manner of Extirpating the Limb, the Surgeon covers all the lower Part of the Leg and the Foot with a Napkin; and being upon one of his Knees, he conveys his right Hand under the Patient's Leg, to take the crooked Knife from a Servant placed on the external Part; and having the Handle of the Knife in his Hand, he lays the Edge of it upon the internal Angle of the *Tibia*, as inwardly as he can, and claps the Fingers of his left Hand upon the Back of the same Knife, to keep it more even.

THE Operator must hold the Knife strait, that is, not more inclined on one Side than on the other, and take care not to press hard upon it, when he goes over the *Spine* of the *Tibia*, for Fear of turning the Edge of it, and so spoiling it for cutting the Flesh neatly. When he has cut the Skin that covers the *Tibia*, he cuts the Flesh in the external Part of the Leg, conveying the Knife towards the hinder Part
of

of that Limb, that he may cut with greater Strength, the *Gemini* and the *Gastrocnemia*; and standing up, he brings up the Knife to cut the internal Part of the Leg, as far as the Place where he began; and thus making a circular Turn, he cuts the Skin, and all the Flesh to be found in the Circumference of the *Tibia* and the *Perone*, excepting that which lies immediately between the two Bones. Some Surgeons advise in the next Place to convey a dismembring Knife into the circular Incision, in order to cut the Flesh left uncut by the great Knife: But when the Operator uses a good Instrument, and is not too hasty, he has no Occasion for the dismembring Knife.

Now the Surgeon must cut the Flesh and the Vessels that lie between the Bones: In order to it, he takes a small strait Knife, or a strait *Bistouri*, which he drives between the two Bones, turning the Back a little towards the Part he designs to preserve; for if he turn'd the Edge that Way, he might split the Vessels, and he would be at great Pains to stop the Blood. Before he quits that Instrument, he must scrape the *Periosteum*, lying upon the *Spine* of the *Tibia*, and take Care always to scrape off the *Periosteum* upon the Part that is to be cut off.

AFTERWARDS the Surgeon uses a Piece of Linnen, one Inch long, or more, and five or six Inches broad: He splits that Linnen at one End as far as the third Part of it, and applies the two Heads of that Linnen about the Bones, one on each Side. He crosses those Heads in the hinder Part of the Leg, and bids a Servant draw them up, as well as the End of that Linnen, which I suppose to be in the internal Part, and which is not cut. By that Means, the Surgeon withdraws the Flesh, and the Bones lying
more

more bare, he is at Liberty to cut them farther, and may cover again the Bones more speedily.

IN order to saw the Bones, the Surgeon takes the Saw with his right Hand, and laying his left Hand upon the Leg, he forms the first Traces of the Saw upon the external Angle of the *Tibia*, as near the Linnen that raises the Flesh, as he can possibly do it. Herein I seem to run counter to some Moderns, who advise to saw the two Bones at once, beginning with the *Perone*. I am perswaded, that if the Operator began to form the first Traces of the Saw upon the *Perone*, he would run the Risk of splintering it, or occasioning a *Diastasis* in it, because it is very weak, and can make no great Resistance to the Saw: That Method would produce Gatherings of Matter and Abscesses, which perhaps would prevent the Success of the Operation: But if the Operator forms the first Traces of the Saw upon the *Tibia*, he runs no Risk, since it is strong and solid. Afterwards he inclines the Saw a little towards the *Perone*, and sawing them both at once, the *Tibia* supports the *Perone*; however the Surgeon must saw the *Perone* in the first Place, and end with the *Tibia*, bidding the Patient let down his Leg a little, in order to facilitate the Effect of the Saw.

WHEN the Saw has formed a Circle round the Bones, the Operator must saw them very fast, and not slowly, as some do; but Care ought to be taken to do it with a light Hand; for when the Saw lies hard upon the Bones, its Teeth get into them, and stop it; and then the Surgeons take a great deal of Pains, and yet only saw as it were by Starts.

THE fourth essential Thing, in the Amputation of Limbs, being, as I have already said, to prevent an Effusion of Blood after the Operation, the Surgeon
must

must take off the second Noose, which had been applied under the Tuberosity of the *Tibia*, to keep tight the Skin and the Flesh; afterwards he bends a little the Thigh and the Stump. He himself loosens a little the *Tourniquet*, if he uses that which has been invented by Mr. *Petit*; but if he uses the common *Tourniquet*, he bids a Servant loosen it, by turning it back half way round, that he may know, by the coming out of the Blood, where the Arteries lie. Assoon as he has well observed the Place, he takes the crooked Needle threaded with a Fillet, and makes two Punctions on the Side of each Artery, without cutting the Fillet, one above the upper Part, and the other under the lower; so that those two Punctions will make four Openings, like a Square, in the Middle of which the Artery and other Vessels will be found.

THE Surgeon must stop with Knots the two Ends of the Fillet, one of which is at the Entrance of the first Puncture, or of the first Stitch, and the other at the coming out of the second: Afterwards he cuts them at four Inches Distance from the Flesh. The Surgeon must take Care to drive the Needle far enough into the Flesh, in order to secure the Tightness of the Vessels, and compress them more exactly: He must do the same Thing in all the Arteries, being careful to loosen the *Tourniquet*, that he may perceive them, and to straiten it, in order to make a Ligature upon them. He must particularly mind an Artery, which is commonly in the *Gemini*, and often emits Blood two or three Hours after the Application of the Dressing; and therefore the Surgeon is not to put on this Dressing too hastily, and must take great Care to wipe the Stump two or three Times (the *Tourniquet* being quite loose) in order to see whether the Blood be well stopped. HA.

HAVING thus explained how the Amputation of the Limbs ought to be made, I proceed to the Dressing of the Patient: The Surgeon must bend the Stump, and draw the Flesh and the Skin about the Bones, as much as he can. Afterwards he lays upon the Vessels lying between the Bones, a narrow and very thick Compress; the two small dry Plagets upon the Bones, small square Compresses upon the other Ligatures, and upon the Whole some Plagets of different Figures, to compress in every Part. We might with the same Intent lay over those Plagets some coarse Lint, without any Figure of Plagets or Dozels. 'Tis true, that by such a Method we depart from the Practice of many Surgeons, who chide the Servants, when they bring Plagets that are not neat and in good Order; but that Regularity of the Plagets does not sit so close upon every Part as when they are shapeless, and the Lint is without any regular Order.

SURGEONS do also commonly use two flaxen Plagets, one covered with *Colophony*, and the other with *Bole Armoniac*, and over those large Plagets covered with astringent Powders, they farther lay a Hog's Bladder. All those Remedies are useless, very perplexing, and even hurtful: They are useless, since the Lint alone is an Astringent and Absorbent, which answers all the Indications. It is well known, why all those Applications are perplexing; and therefore I need not dwell upon it; but it is not improper to know, that those Powders are extraneous Bodies, which occasion Obstructions, Inflammations, and sometimes the Consequences of those Diseases; Besides, they retard the Suppuration, and stick so close to the Circumference of the Stump, that 'tis extreamly difficult to take them off, as I

have

have often observ'd, so that the Stump bled on all Sides after the removing of those Astringents.

I HAVE seen that Operation performed by Mr. *Petit*, who only uses more Plagets, in the Manner above-mentioned; and on the third Day the Suppuration was come to a Head, the Plagets falling off themselves, without any Need of pulling them, as must be done when the Plagets are made of Flax.

AFTER the Application of the Plagets, that Surgeon advises us to use a Plaister made like a T, with four Heads, covered at the End of those Heads with the Plaister of *Andreas a Cruce*, to draw the Skin and the Flesh over the Bones. If I have said that the Hair should be shaved before that Operation, 'tis in order to prevent that Plaister, which is a powerful Agglutinative, from sticking to it, and occasioning Pain when 'tis taken off. The Surgeon lays over the Plaister a square and thick Compress, not exceeding the Circumference of the Stump; he covers it with the double Compress made in the Form of a *Malta* Cross; he applies one of the Arms of it under the Ham, and the Middle of the Cross passing over the Stump, the opposite Arm is applied upon the fore and upper Part of the Leg, &c.

AFTERWARDS the Surgeon applies the longitudinal Compresses, which must not be very broad, to make a strong Compression. He reverses one End of the first, about four Inches upon its Body, and applies that reversed End to the hinder and upper Part of the Leg; the other Head of the Compress, passing over the Stump, comes upon the Knee. Afterwards the Surgeon takes the second longitudinal Compress, with both Hands, by its two Ends, and applies the Middle of it upon the Stump, conveying the Heads all along the Sides of the Leg, to cross
above

above the Knee. Lastly, he applies the Middle of the third longitudinal Compress immediately upon the hinder Part of the Leg, on the Edge of the Stump; and then he proceeds to cross in the fore Part, from whence the Heads being conveyed upon the Sides of the Knee, cross one another above it, where they are stopped. That whole Dressing is supported by the following Bandage, called the *Capeline with one Head*.

Of the Bandage called the Capeline with one Head.

THE Roller that is to be used for the *Capeline with one Head*, in the Amputation of the Leg, must be three Inches broad, and about six and thirty Foot long.

THE Surgeon begins that Bandage with two circular Turnings upon the Edge of the Stump, to compress the Flesh and the Fat, which swell as soon as they are exposed to the Air. Afterwards he proceeds by Edgings to the Knee, and when the Globe is in the external Part, (I suppose the right Leg has been cut off) he conveys it above, to pass laterally and internally upon the Middle of the Stump. In the next Place he conveys the Globe of the Roller upon the Knee, passing upon the external Side of the Stump; from thence he descends internally to pass a second Time directly upon the Stump, taking care that this last Turning may cross the foregoing obliquely: He ascends upon the Knee, about which he makes a Circular to descend anteriorly and laterally, from above downwards, upon the Stump, taking care that this third Turning may still cross the first obliquely; so that those three Turnings represent a Stole, which is not only very neat, but
also

also makes a considerable Compression. Afterwards he ascends upon the Knee to convey the Globe under the Ham, that he may descend all along the hinder Part of the Stump, and pass directly over it, by crossing with the first Turning. Afterwards he conveys the Lint upon the Knee, passing along the fore Part of the Stump, where he inverts it, if he pleases, to cross again twice upon the Stump, or fill up the Vacuities. Lastly, he ascends again upon the Knee, from whence he descends obliquely to the lower Circumference of the Stump, where he makes one or two circular Turnings, and then he ascends again obliquely to the upper Part of the Thigh, which is generally uncovered.

THE Circumvolutions of the Lint reaching from the Knee directly to the Stump, are called the Turnings of the *Capeline*; these must be very tight, because they compress the Vessels directly. The others, on the contrary, which we call *Circulars*, being only used to encompass the first, need not be so tight by a great deal.

AFTERWARDS the Surgeon lays down the Patient, and places his Stump upon a Cushion somewhat raised; A Servant stays by the Patient, and lays one of his Hands upon the Stump, and the other upon the Knee, to compress the Dressing directly upon the Vessels.

SOME Practitioners advise to put a Compress, a Noose, and a *Tourniquet*, upon the internal Part of the Thigh, in order to use it, if the Blood should come out, whilst the Operator is sent for.

THE Patient must keep to a strict and regular Diet, and be blooded more or less, according to his Strength; for if he be of a sanguine or bilious Constitution, he ought to be blooded four or five

Times the first Day, and twice, at least, the second Day. By that prudent Method Patients frequently save their Lives, who would otherwise fall into Convulsions, and a *Delirium*, which would occasion their Death; as it happened to the Sailmaker of the Ship, called the *Count of Toulouse*, where I was one of the Surgeons. And if the convulsive Motions, either of the whole Body, or of the Part, break the Arteries, and make them reascend, Practitioners advise, to apply immediately a Button of Vitriol upon the Part, to press it well with Compresses and Lint, and so on with the remaining Part of the Dressing, as I have said above.

To explain the Cause of those Disorders, it may be said, that the Spirits, which used to run in the lower Part of the Leg, and into the Foot, being stopped by the Section and Ligature of the Nerves, are forced to run back into the Brain; and the Irritations are violent, by Reason of that violent Reflux. And because that Reflux continues, the Spirits will be disordered in the Brain, and consequently will discompose all the Animal Functions. *Phlebotomy* ought therefore to be frequently repeated, in order to abate the Impetuosity of the Blood, and to allay the Ferment of the Humours.



CHAP. XLIX.

Of the Amputation of the Leg, when Part of it is left; invented at the same Time by Mr. Sabourin, a Surgeon of Geneva, and Mr. Verdevin, a Dutch Surgeon.

THOUGH the Amputation of the Leg be most commonly used in the Manner above described,

bed, yet the Readers will not be displeased to find here a different Method, which is of very great Use.

To make the Amputation of the Leg, by preserving one Part of it, the Patient must be placed much in the same Manner, as in the foregoing Operation. Afterwards the Surgeon applies the Cushion, with which he is to prevent an Effusion of Blood, upon the internal and upper Part of the Thigh, and the *Tourniquet* upon the external Part, because it is not so troublesome in that Place, and must remain in it 'till the Cure be over.

THE Operator being placed between the two Legs of the Patient, takes a strait Knife, whose Blade is about six or eight Inches long, and one and an half or two broad, and must be sharp on both Sides. He makes with it a semicircular Incision, two Inches under the Tuberosity of the *Tibia*, and cuts only the Skin and the Fat, that are on the fore Part of the Leg; I mean upon the *Perone* and the *Tibia*, taking Care not to lean hard upon those Bones, to preserve the Edge of his Knife. When he comes to the internal Part of the *Tibia*, he turns the Knife obliquely to cut, as he descends towards the lower Part of the Leg, about one Inch of the Skin and Fat. Afterwards he conveys his left Hand to the external Side of the Leg, to keep the Flesh in its due Situation whilst he pierces it as near the *Perone* and the *Tibia* as he can; and without stopping he comes down lower, cutting the *Gastrocnemia* and the *Gemini*, according to their Length, and making of Part of those Muscles, and of the Skin, a Shred of a triangular Figure, and about six or eight Inches long.

WHICH being done, he quits that Knife, to take another much narrower, in order to cut the Flesh

and the Vessels lying between the Bones ; They ought to be cut as exactly as possible to avoid a Suppuration. Afterwards he cuts the *Periosteum* about the *Tibia*, scraping the Bone on that Side on which it is to be cut off. In the next Place, the Operator is to give two or three Cuts lengthwise with the Point of the Knife upon the Extremity of the Bone he designs to preserve, in order to cut the *Periosteum*, that he may prevent its Inflammation. The same Precaution ought to be used with Respect to the *Perone*.

THE next Thing is to saw the Bones ; but because the Shred lies in the Surgeon's Way, he raises and supports it with a single Compress, six Fingers broad, and a Foot long ; he splits that Compress about two Thirds, and applies its two Heads on both Sides of the Bones, bidding a Servant hold them towards the Knee ; and the Body of that Compress must be conveyed and fastened towards the Ham by the same Servant, to raise the Shred, and secure it from the Teeth of the Saw.

AFTERWARDS the Operator saws the Bones, observing the Rules above-mentioned, for the usual Amputation of the Leg ; and, as soon as they are cut, he must convey his Hand under the Shred, and bring it near the Bones to cover the Stump with it ; and therefore he must cut it, if it be too long, and lessen the Flesh, if there be too much of it. Lastly, the Operator must adapt it to the Stump upon which he applies it. In order to keep always the Shred in that Situation, he may make some Stitches to it. I think the dry Suture, together with the Plaister of *Andreas a Cruce*, would be very proper. I must observe, that during those several Operations, a Servant must always keep his Hand upon the Shred, to move it towards the Stump. IN

IN order to dress that Amputation, the Surgeon lays two long Plagets in the Circumference of the Stump, one on each Side, and a Compress in six or eight Doubles upon the Shred, to press the Vessels directly; He covers that Dressing with a Plaster in the Shape of a T, with five Heads, and with some Compresses of a like Figure; and he supports the Whole with the following Bandage; that Bandage consists in making some circular Turnings in the upper Part of the Leg, and some converted ones tyed with Pins, and conveyed above the Stump.

HE leaves the Stump stretched, and puts it into a Kind of Cawl made of shammy Leather, having four Heads in its Circumference, two of which must be tyed about the Body, and the two others about the Thigh.

THE Surgeon lays the Patient down, and puts the Stump upon a Cushion; a Servant sitting by him must always have one Hand applyed upon the Shred, and consequently opposite to the Column of Blood, that the Flesh being thus propelled may make a more direct Compression than upon the Sides.

THE *Tourniquet* is of great Use in this Sort of Amputation, since the Vessels are not tyed, and the Compression of the Shred is the only Thing that prevents the Issue of the Blood. The *Tourniquet* must therefore be always kept on, and loosened in such a Manner, as to let in no more Blood than is necessary for the Nourishment of the Stump; which will be known, by laying the Fingers on the hinder Part of the Ham, where the beating of the Artery is felt; and if it be too strong, the *Tourniquet* must be braced a little tighter, on the contrary, it must be slackened a little, when that beating is not felt.

'Tis plain, that the usual *Tourniquet* could hardly be of any Use in this Way of cutting off the Leg, for a Servant could not hold it so long, in the Degree of Tightness or Slackness which is necessary. On the contrary, Mr. *Petit's Tourniquet* perfectly answers all Intentions; and it may compress the Arteries to such a Degree, that they will only let in as much Blood as is necessary for the Nourishment of the remaining Part of the Extremity; which is of no small Consequence, since the Success of that Operation depends upon it.

THIS Way of cutting off the Leg is attended with several Advantages. *First*, It affords a speedy Cure; since the Surgeon need only forward the Reunion, and prevent the Suppuration. *Secondly*, The Patient being cured, can move the remaining Part of his Leg; and the Bone forming a Cavity in the *Gemini*, and those Muscles growing hard, a Man may walk with a wooden Leg, hollow in the Inside, and no Body will distinguish it from a true Leg.

MR. *Petit* has seen some Officers upon whom that Operation had been performed, who danced and leaped, as if their Legs had not been cut off.

IF Phlebotomy is of Use in Amputations, it is, doubtless very necessary in this Operation, since the Quantity of the Blood and its Motion ought to be lessened. And because the only Design of the Surgeon is to procure the Union of the Shred with the Stump, the Plagets must not be taken off, but only moistened with some spirituous Balsams; and Care must be taken to have the Shred always rest and press upon the Bones.



C H A P. L.

Of the Amputation of the Thigh.

IN the Amputation of the Thigh, as well as in that of the Leg, the Operator must first get the Dressing ready, which differs only from the Dressing of the Leg, because the Pieces of which it consists ought to be every Way larger.

The Dressing being ready, the Surgeon sets the Patient upon the Edge of his Bed, and shaves the middle and lower Part of the Thigh, to prevent the agglutinative Plaister, that is to be used, from sticking to the small Hairs, which cover the Skin. Afterwards the Operator, being placed near the external Part of the Thigh, must mind the four Circumstances, which I have mentioned for the Amputation of the Leg; the first of which consists in preventing an Effusion of Blood during the Operation.

To that End, he applies the Cushion of one of the two *Tourniquets* above-mentioned to the internal and middle Part of the Thigh, because the Vessels run that Way to go to the Leg. Afterwards he places the *Tourniquet* in the external Part, and bids a Servant brace it sufficiently, in order to compress the Vessels, and stop the Blood. 'Tis observed, that the Thigh ought to be in a Line parallel to the Body, that the Muscles may not leave the Bone bare, after the Amputation. In the next Place, the Surgeon conveys his right Hand above the Patient's Thigh, to take the crooked Knife, which a Servant must give him between the Thighs, that the Patient may not see it; he raises his Hand and Arm

to bring the Edge of the Knife near the fore and external Part of the Thigh, two Inches above the Knee; for in that Place the Thigh is generally cut off. Afterwards laying the Palm of his Hand upon the Back of the Knife, to make the Incision with more Strength, he cuts the Flesh circularly, as I have said for the Amputation of the Leg; but if he minds the second Circumstance, which consists in preserving as much of the Skin as possible, he must not observe that Method of cutting the Skin and the Flesh, since it always leaves two Inches of the Bone bare; and from the Edge of the Skin to the Edge of the cut Bone, there are five or six Inches, as I observed in the Hospitals, where I saw that Operation performed.

IN order to avoid that Accident, which retards very much the Cure of those Amputations, we must follow Mr. *Petit's* Advice; I mean, that the Incision of the Skin and Flesh, which cover the lower Part of the *Femur*, ought to be made at two several Times. For Instance, when the Surgeon has placed the *Tourniquet* in the middle and internal Part of the Thigh, he draws the Skin from the Knee towards its upper Part, and applies a second Noose one Inch above the *Rotula*, which keeps the Skin from shrinking. Afterwards the Surgeon takes the crooked Knife, as I have just now said, and makes a circular Incision between the Ligature and the *Rotula*, in which he only cuts the Skin and Fat, 'till he sees the Muscles; Assoon as he perceives them, he takes off that second Ligature, and gets the Skin raised by a Servant, who takes hold of the Thigh with his Hand on both Sides; the Operator sees then the crural Muscle, the *Vastus Internus*, and *Externus*, &c. layed bare under the Skin

about

about two Inches. He takes the crooked Knife, and cuts those Muscles circularly, as I have said, as near the Skin that is to be preserved as possible; and by that Means he will lay open the Bone exactly in the Place where 'tis usual to cut it, *viz.* three Inches above the Knee.

To observe the third essential Circumstance of this Operation, the Surgeon must take a Compress split at one of the Ends, as I have already said, and apply the two Heads between the two cut Pieces of Flesh. He crosses the Heads, and bids a Servant draw them upwards together with the Body of the Compress; by which means the Flesh to be preserved, is withdrawn and secured from the teeth of the Saw. Afterwards the Surgeon scrapes the *Periosteum*, leaving none of it upon that Part of the Bone, which is to be cut off; and standing near the external Part of the Thigh, saws the Bone with a light Hand, though he takes long Stroaks.

Lastly, the fourth Circumstance consists in preventing an Effusion of Blood after the Operation; which will be effected by making Ligatures in the Vessels, in the same manner as I have said for the usual Amputation of the Leg. There are three Arteries in the Thigh, wherein that Ligature ought to be made. Afterwards the Surgeon slackens the *Tourniquet* wholly to see whether all the Vessels be well stopped, and takes Care to wipe the Stump with small Rags, in order to perceive that Part which affords the Blood.

BEFORE he applies the Dressing, he must bring the Flesh and Skin near the Extremity of the cut Bone; and if he makes the Incision at two several Times, as I have said, he will have the Satisfaction
of

of seeing the Flesh level with the Bone, and half covered with Skin.

To dress that Amputation, he lays a Plaget upon the Bone, small and thick Compresses upon the Vessels, a round Plaget upon the Stump, and over that Plaget some Lint put together without order. Afterwards he lays a Plaister of *Andreas a Cruce*, made like a T, with four Heads. He applies the Body of that Plaister about the Thigh, and crosses the Heads one above another, passing upon the Stump. Over that Plaister he lays a square Compress in five or six Doubles, the Compresses in the shape of a Malta Cross, and the longitudinal Compresses, as I have shewed. Lastly, he supports the whole by the following Bandage.

Of the Bandage proper for the Amputation of the Thigh.

FOR the Amputation of the Thigh, the Surgeon uses a Roller, three or four Inches broad, and about thirty Feet long, with one Head. He begins with two Circulars upon the lower End of the Stump, as I have shewed for the usual Amputation of the Leg, and for the same Reasons. Afterwards he ascends obliquely to the upper Part of the Thigh, in order to put the Globe of the Roller about the Body, and come again to the Stump; from whence he ascends a second Time upon the Stump, crossing there with the first turning. In the first Place, he must convey the Roller to the upper Part of the Thigh, and there makes Turnovers tied with Pins, to pass again twice upon the Stump, where he fills up the Vacuities of the two

first

first Turnings ; which makes a very good Compress in the shape of a Star. Afterwards he conveys the Roller obliquely upon the Edge of the Stump, where he makes two Circulars, and ascends by Edgings to the upper Part of the Thigh. Lastly, he passes about the Body to tie the Roller where it ends.



CH A P. LI.

Of the Amputation of the Fingers.

THE Antients believed that the Wounds of the Articulations were absolutely incurable, and prepossessed with that Opinion, they durst not cut off the Limbs in their Articulations.

HOWEVER when the Fingers were crushed, gangrened, rotten, &c. they cut them off ; but they used very painful Methods, and such as were frequently unsuccessful.

ALL of them prescribe cutting off the Fingers in the middle of their *Phalanx's*. Some used incisive Forceps's for that Operation ; others put the Finger upon a Block of Wood, and laying a Chisel upon the middle of the Body of the *Phalanx*, they struck one Stroke with a Mallet upon the Head of the Chisel, and so cut off the Finger. Lastly, others thought the best way was to use small Saws, with which they sawed the Fingers in the middle of their *Phalanx's*.

BESIDES the Cruelty of the two first Methods, and the violent Pain occasion'd by them, they were also frequently attended with Accidents, which prevented the Success of the Operation ;

for

for sometimes they splintered the Bones; the Disease was followed by very sad Symptoms; and the Cure was long and very difficult. I add, that when the *Phalanx's* are cut in the middle of their Body, the remaining End is very much deformed, useless and troublesome, especially when 'tis the first *Phalanx*, I mean that which is contiguous to the *Metacarpium*. That Inconveniency always happens, when the third Method of the Antients is used.

To make the Amputation of a whole Finger, if it be the middle one, or the Ring Finger, the Surgeon must lay bare its Articulation, the Bone of the *Metacarpium*, by making an Incision on each Side with a strait *Bistouri*, penetrating between the Bones of the *Metacarpium* under their Head. And if it be the first or little Finger, it will be sufficient to lay it bare only on one Side, as it appears by the Inspection of the Part.

Mr. *Thibaut* says, that Incision ought not to be made exactly in the middle of two Fingers, but on the Side of the Finger, that is to be cut off, in order to preserve more Skin, and to procure a Scar less deform'd, and a more speedy Cure. Afterwards the Surgeon with the same *Bistouri* cuts the Finger in the Articulation, taking Care to bend it first, in order to perceive better the Place of the Articulation, and to preserve its Ligaments more easily. When the Ligaments of the Articulation are half cut, the Operator stretches or streightens the Finger without taking off the *Bistouri*, and makes an End of cutting the Ligaments. If he feels any Resistance, it is only occasioned by the *Sesamoid* Bones; and then he must cut either higher or lower, without quitting the Head of the Bone with the Instrument.

THE Hemorrhagy, which happens after that Amputation, is not considerable. However, if the Blood should come out with Violence, a Ligature might be made. Mr. *Petit* advises afterwards to cut lengthwise the Sheath of the Tendons, at least about an Inch, in order to avoid a Constriction, and consequently an Inflammation, and the Abscesses which happen in the Hand, when such a Precaution is not used.

THE Dressing consists in laying a dry Plaget upon the Head of the Bone of the *Metacarpium*, and over it two or three notched Compresses, that the other Fingers may find room in the Notches, and they are raised to a certain Height, that they may be able to make a strong Compression upon the Vessels.

ABOVE those Compresses the Surgeon lays a Sling with four Heads, and covers it with two small long Compresses applied crosswise. Afterwards he supports the whole with the following *Bandage*.

Of the Bandage proper for the Amputation of the Fingers.

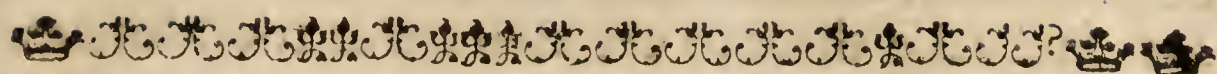
WHEN the three Phalanx's of the middle or Ring Finger are cut off, the Surgeon, to support the Dressing, uses a Roller that is an Inch broad, and about eighteen Feet long, with one Head.

HE applies the End of the Roller upon the external and hinder Part of the Wrist, and makes two Circles about it. Afterwards he conveys the Globe upon the back of the Hand to pass obliquely upon the middle of the narrow long Compresses, that are applied cross-wise ; and then he conveys the Roller

into

into the Palm of the Hand, to go upon the *Thenar*, and make a Circular about the Wrist. The Roller being in the fore Part of the Wrist, the Surgeon conveys it obliquely upon the small Compresses, to cross with the turning already made upon it. Afterwards he conveys the Roller into the Palm of the Hand, to pass upon the hinder Part of the *Hypotenar*, and make a Circular about the Wrist. He makes a Turnover upon the external Part of the Wrist, and conveys the Roller into the Hand, by passing upon the Wound to form with the two foregoing Turnings a Star, which makes a strong Compression; and then he passes over the *Thenar*, and makes a Circular about the Wrist, and passes the Roller upon the back of the Hand, and upon the lower Part of the Bone of the *Metacarpium*, which supports the little Finger; from whence passing transversely under the other Bones of the *Metacarpium*, he makes a Circular Turning in that Place, which supports those that have been made upon the Wound. Afterwards the Surgeon proceeds again from the Palm of the Hand to its back, to make a *K* upon the *Metacarpium*, and make an End with Edgings all along the Fore-arm; taking Care to lay before those Edgings some Compresses along the *Cubitus* and *Radius*, in order to compress the radial and cubital Arteries, and prevent their carrying so much Blood towards the Fingers.

It is not improper to blood the Patient, and to prescribe a regular Course of Diet, till the time of the Accidents be over. Glysters and other Remedies are to be used, as occasion requires.



C H A P. LII.

Of the Amputation of the Fore-Arm.

BEFORE the Surgeon makes the Amputation of the Fore-Arm, he must, as well as in the Amputation of the other Limbs, get his *Apparatus* ready, which differs only from the *Apparatus* of the Leg, according to the different Diameter and Size of the Pieces whereof it consists.

THE *Apparatus* being ready, the Operator places the Patient upon a Chair, and covers his Face with a Napkin, that he may not see the Operation. And because the first Circumstance of it is to prevent an Effusion of Blood, he applies upon the internal and middle Part of the Arm the Cushion of the *Tourniquet* ; he fastens it with a circular Compress, and adapts the Noose over that Compress.

THE Surgeon standing by the external Part of the Fore-Arm, which he designs to cut off, bids a Servant hold the Patient's Hand, whilst another holds the upper Part of the Fore-Arm. I suppose some other Servants hold the Patient so fast, that he cannot stir. Afterwards the Operator puts his Hand under the Fore-Arm, to take the crooked Knife from a Servant, with which he makes a circular Incision, two Inches above the Wrist, applying the Edge of the Knife upon the *Radius*, as exactly as he can.

IN order to cure the Patient speedily, that circular Incision ought to be made at two several times, according to Mr. *Petit's* Direction ; I mean, that

that the Surgeon must only cut at first the Skin and Fat, and raise them to cut afterwards the Muscles, with a second Incision.

IN the next Place, the Surgeon must have a small and very narrow Knife, to pass between the Bones, turning its Back a little more towards the Part that is to be preserved, for the Reasons above-mentioned. He scrapes off the *Periosteum* of the two Bones, &c.

To saw the Limb (which is the third Circumstance) the Operator takes a Saw, with which he forms the Line, in which he is to cut upon the *Cubitus*; afterwards he inclines the Saw upon the *Radius*, and endeavours to end with the *Cubitus*, or at least he makes an End of the Operation by sawing both at once.

Now he must prevent an Effusion of Blood; and therefore he bids the Servant, who holds the *Tourniquet*, to slacken it by half a Turn; or if the Operator uses Mr. *Petit's Tourniquet*, he will do better to slacken it himself, as he thinks fit. When the Place of the Arteries is known by the Blood that comes out, they must be tyed. We have here three Arteries, the *radial*, the *cubital*, and that which creeps along the membranous Ligament, that fills up the Space between the two Bones.

If those Ligatures are too difficult, the Surgeon uses the Crow-bill'd *Forceps*, with which he dresses the Artery, and withdraws it a little to make the Ligature with a crooked Needle threaded with a Fillet, as is usual; or else he makes a Surgeon's Knot upon the Crow-bill'd *Forceps*, and presses the Artery with that Instrument. Afterwards he makes the Ligature to glide from the Crow-bill'd *Forceps*, upon the Artery, and compresses it exactly in that Manner.

THE same may be done with another Instrument, called the *Valet á Patin*; nay, the latter is preferable to the former, because it has a Spring, which keeping it fast, will sufficiently compress the Artery to make the Ligature. Besides, the Operator who uses that Instrument, needs no Servant, since he may let it hang down, whilst he fastens the Vessel.

IF, notwithstanding all the Ligatures, the Blood should come out when the *Tourniquet* is slackened, the Surgeon must pinch the Vessel with the *Valet á Patin*, as I have just now said, and drive the Needle farther into the Flesh to make a second Ligature; and if all those Precautions are useless, he must have recourse to the Button of Vitriol, and the Compression together.

THOSE different ways of stopping the Blood shall be used in the Amputations above-described, if there is occasion for them.

To dress the Patient, the Surgeon bends the Stump a little; and then lays upon it the Ligatures made of small and thick Compresses. He covers the two Bones with small and dry Plagets. Afterwards he brings the Skin nearer, which, as we have cut it, must cover one half of the Stump, and consequently hasten its Cure. In the next Place, the Surgeon takes some Lint, which he applies upon the Stump without any set Order, and lays over it a round Plaget, and others of irregular Figures. He puts upon that Dressing a Plaister, in the Shape of a *Malta-Cross*, if he thinks fit, though to speak sincerely, it is very useless in the first Dressings. He covers that Plaister with Compresses of the same Figure, and lays over them longitudinal Compresses, as I have said, speaking of the other Amputations, only with this Difference,

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rence, that they must be very narrow. Lastly, he supports the whole with the following Bandage.

Of the Bandage proper for the Amputation of the Fore-Arm.

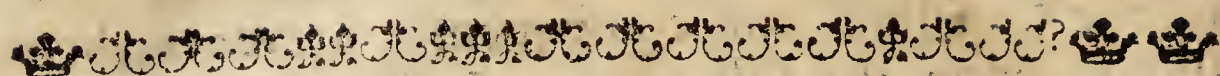
THE Roller used for the Amputation of the Fore-Arm, is commonly three Inches broad, and about thirty Feet long, with one Head. The Surgeon applies the End of the Roller obliquely upon the Edge of the Stump, where he makes two circular Turnings, and then he ascends obliquely to the Elbow. Afterwards he passes the Roller behind the Elbow, I mean upon the lower and hinder Part of the *Humerus* ; and he proceeds externally along the Fore-Arm, to pass directly upon the Stump. Afterwards he conveys the Globe of the Roller along the internal Part of the Fore-Arm, to pass again behind the lower and hinder Part of the *Humerus*, and come to the Fold of the Elbow, that he may descend to the fore-part of the Stump, and cross with the foregoing Turning. He ascends again, making the Roller to run obliquely towards the external *Condylus* of the *Humerus*, upon the upper of which he passes, to come internally along the Fore-Arm, and to pass a third time directly over the Stump, taking Care in this last Circumvolution to cover the Vacuities, which the Cross leaves upon the Stump ; which represents a Star, that is very binding. The Surgeon ascends again, to pass behind the Elbow the fixed Point of all the Turnings of the Capeline ; and he makes a Circular in the upper Part of the Fore-Arm, which stops and fastens the Turnings of

of the Capeline, and consequently prevents their sliding upon the *Olecranon*. Lastly, he descends by Serpentine to the Edge of the Stump, where he makes a Circular, to ascend again obliquely to the lower Part of the *Humerus*, about which he makes a whole Circular, and ends the Bandage about the Arm.

SURGEONS advise to leave as much of the Fore-Arm as possible, when there is a Necessity to cut off that Limb. This is good Advice, provided the Muscles have not been pulled and bruised, as it happens when a Gun bursts in the Hands, or when the Wrist, the Tendons of the Muscles, and the Fingers have been, as it were, pulled off by the Splinter of a Bomb, or of a Ship; for in that Case if the Surgeon will avoid a great Suppuration, he must cut off the Fore-Arm in the Fleehy Part of the Muscles.

Mr. *Petit* having perform'd that Operation, in consequence of a Gun, that burst in the Hands, endeavoured to preserve as much of the Fore-Arm as he could; but his Foresight, commended by all Authors and Surgeons, proved very useless, as he himself owns; for, not long after the Amputation, the Muscles floated in the *Pus*, which was contained in the Membrane near each Muscle, and Part thereof being converted into the Mass of Blood by the Circulation, occasioned a Fever, of which the Patient died.

SURGEONS of great Worth and Learning grow wiser by their own Faults; nay, they acquaint the Publick with them, to give occasion to new Reflections upon the Parts; and they exhort Practitioners not to follow blindly the Advices of Authors.



C H A P. LIII.

Of the Amputation of the Arm.

THE Amputation of the Arm does not differ much from that of the Thigh. However, I shall give an Account of it, that the Surgeons may know all the different Amputations.

To perform that Operation, the Surgeon places the Patient upon an Elbow-chair, covers his Face with a Napkin, that he may not be terrified, and wraps up the Fore-Arm and the Hand with another Napkin.

THE Operator having a Cloth before him, like an Apron, as I have said in the Amputation of the Leg, stands by the external Part of the Arm, and taking the thick Compress, or the Cushion of the *Tourniquet*, (and suppose the Dressing to be ready) applies it upon the external and middle Part of the Arm. He supports that Compress by another, which is circular, or uses the *Tourniquet* newly invented. Afterwards he passes his right Hand under the Patient's Arm, to take the Knife from a Servant, and raising the Hand, he conveys the Edge of the Instrument, as much as he can, towards the external Part, and lays the Palm of his left Hand upon the Back of the Knife, to use the Instrument with more Strength, and cuts circularly the Skin, the Fat, and the Muscles, two Inches above the Jointure, or else he makes the Incision at two several times, as I have often recommended. This is the best Practice.

THE third general Circumstance of Amputations consists in cutting the Bone ; and therefore the Surgeon draws the Flesh towards the upper Part of the Arm with the split Compress. Afterwards he scrapes the *Humerus* in its Circumference, to take off the *Periosteum*, and saws it as near the split Compress as he can.

To prevent an Effusion of Blood after the Operation, the Arteries must be tied in the manner abovemention'd. There are generally three in the Arm, which want that Operation, as I have seen it perform'd by Mr. *Petit* upon a young Man of twenty Years of Age. The first Artery that appeared, when the *Tourniquet* was half slackened, was situated in the internal Part of the Arm, near the *Humerus*. The other in the internal Part proceeding from the middle of the Muscles. Lastly there was a small one in the external Part, which ran to the Skin, and was stopped with Lint, upon which the Surgeon laid his Finger.

AFTER all those Ligatures, the *Tourniquet* was quite slackened, and Mr. *Petit* wiped the Stump with small Rags ; and because the Blood did no longer come out, he dressed the Patient in the following manner. He applied small and thick Compresses upon all the Arteries ; a dry Plaget upon the Bone ; and above all that a great deal of Lint, and Plagets of irregular Figures, to make an even Compression every where. He covered that Dressing with a *Malta* Cross folded double, taking Care to keep one Hand upon the Stump, in order to compress the Vessels directly, which ought to be observed in all Amputations.

ABOVE that *Malta* Cross the Surgeon applied a small square Compress, dipt in Brandy. After-

wards he laid the long Compresses, folding into two the End of the first, to apply it upon the internal Part, that the Vessels might be still compressed. He crossed the second long Compress upon the Stump, and the third made a circular Turning upon its Edge. The whole was supported by the following Bandage.

Of the Bandage proper for the Amputation of the Arm.

THE Roller, that is used to support the Dressing in the Amputation of the Arm, is about thirty Feet long, and three Inches broad, with one Head. The Surgeon applies the End of it obliquely upon the external and lower Part of the Stump, suppose the right Arm to be cut) and holding it with the left Hand, he fastens it with two Circulars made upon the Edge of the Stump, to bring together the Coats of the fatty Cells, which are at a great Distance from one another by a kind of *Emphysema*, occasioned by the Impression of the Air. Afterwards the Surgeon ascends obliquely to the upper Part of the Arm, and then conveys the Globe to the *Acromion*, and from thence to the *Sternum*, and under the left Arm-pit, proceeding obliquely behind the Back, and forming a *K* upon the right *Acromion*, to descend along the forepart of the Arm. Afterwards he passes directly upon the Stump, conveying the Globe of the Roller, first along the hinder Part of the Arm, and then along the external Part, to pass a second time upon the *Acromion*, upon the *Sternum*, under the left Arm-pit, obliquely behind the Back, and form a second *K* upon the *Acromion*, taking

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Care that it be above the first. Afterwards he must descend along the internal Part of the Arm, to pass a second time directly over the Stump, taking Care to cross with the foregoing Turning; and then he ascends along the external Part of the Arm, to pass a third time upon the *Acromion*, upon the *Sternum*, under the left Arm-pit, obliquely behind the Back, and make a third *K* above the two first upon the *Acromion*. He brings down again the Roller along the Arm, to pass a third Time over the Stump, taking Care to cover the Vacuities, which the other Turnings have left, which forms a Star of great use in all the *Capelines*, as I have said above, not to mention the Beauty of the Bandage. The Surgeon conveys a second time the Roller along the Arm, to pass upon the *Acromion*, upon the *Sternum*, under the left Arm-pit, obliquely behind the Back, and to come upon the right *Acromion*, in order to cover the *K*'s that have been made on it. Lastly, he conveys the Globe by *Serpentines* downwards about the Arm; and being come to the Edge of the Stump, he makes a Circular, and then he ascends obliquely to the *Acromion*, and ends the Bandage about the Body.

AFTER the Operation, the Patient is laid down, and the Stump must be supported by a Cushion. It must also be covered with a Sheep's Skin, or something else, which ought to be warmed now and then, in order to keep up the Heat in that Part.

THE Cure of Amputations consists in bleeding the Patient, if his Pulse rises never so little; in giving him a Clyster now and then, and nourishing him only with Broth, every three Hours, Night and Day, and sometimes with a Spoonful of Jelly.

THOSE different Amputations must be dressed only four and twenty Hours after, at the soonest; and in the first Dressing the Surgeon must only take off the Roller and the long Compresses, and then imbibe the remaining Part of the Dressing with warm Brandy. On the third Day, the Plagets do generally stick still, and therefore they are imbibed again with the same Remedy, and the Dressing is laid on again. Lastly, on the fourth or fifth Day, the Plagets fall off themselves; and then the Surgeon must dress with Lint-plagets covered with a Digestive, and take Care not to remove the Compresses from the Arteries, 'till they fall.

IN that gentle and easy Method of dressing Amputations, the Surgeon sees, on the fourth or fifth Day, a fine Suppuration of well digested Matter, and not too plentiful. And when he has used Astringents, which contract the cut Extremities of the fleshy Fibres, and the small Capillary Vessels, there happen in those Parts small *Phlogoses*, which inflame the whole Stump, and retard the Suppuration very much; and when it comes to a Head, it grows so plentiful, upon the *Phlogoses* being resolved, that there happens a considerable Loss of Substance, as I have most times observed in the Hospitals.

SINCE the Air contracts the Extremities of the same Vessels to such a Degree, and coagulates the nutritious Juices contained in them, in such a manner, that it frequently occasions a Reflux of Matter, which makes the Wound dry, or too plentiful a Suppuration, whereby a great deal of Substance is lost; it cannot be denied, that the Impression of the Air is very pernicious, and consequently

sequently that frequent Dressings are dangerous: If the Patients are dressed twice a Day in Hospitals, 'tis because Astringents have been used, which occasion afterwards Suppurations so plentiful, and very often so serous, 'that 'tis necessary they should be dressed frequently; besides, the gross and corrupt Air, that prevails in those Places, requires it; But that Method ought not to be exactly observed elsewhere; and the Surgeon must dress seldom, and as quick as possible.



CHAP. LIV.

Of the Amputation of the Arm in the Joint.

THE Arm ought to be cut off in its Articulation with the Shoulder Blade, for two plain Reasons; the first is a Fracture of the upper Part of the *Humerus*, occasioned by the bursting of a Bomb, the Fall of a House, and a Thousand Causes of that Nature: The second is the Defect of the Joint itself; such as the swelling of the Head of the *Humerus*; or a Defect in the Articulation, such as an Abscess, &c.

THIS is a very difficult and long Operation; and therefore to remove those Difficulties, a Surgeon must never undertake it, without the Advice of Physicians, and other experienced Surgeons.

BEFORE he proceeds to that Operation, his Dressing must be ready, as well as in most other Operations. He places the Patient upon a Chair, and in a convenient Place; he covers his Face with a Napkin folded in two, that he may not see the Operation. That Operation is very different from other Amputations, because no *Tourniquet* is used to stop the Blood, and the Ligature is made in the Vessels before the Flesh is cut.

To

To prevent an Effusion of Blood after the Operation, I shall set down the Method of Mr. *Petit*, a Man of a vast Genius, and a great Surgeon. In the first Place, he raises the Patient's Arm, which makes a right Angle with the Body.

THE Arm being thus raised, the Surgeon perceives the Vessels that run into the Arm-pit; but if the Distension is so great, that he cannot perceive them, he must make lateral Incisions.

AFTERWARDS he takes a crooked and large Needle, sharp on both Sides, and threaded with a Fillet, consisting of six or eight Threads; he conveys the Point of the Needle on the Side of the Arm-pit, and two Inches from it; he drives it in, 'till he finds the Neck of the *Humerus*, which he scrapes, if I may so say, with the Point of the Needle, and brings out the Point of the Needle on the other Side of the Arm-pit.

WHEN I say that he scrapes the Bone with the Point of the Needle, I mean, that he must pierce the Flesh by passing the Needle as near the Bone as possible; but the Bone ought not to be grated; for that Operation would be extremely painful; and the Point of the Needle being blunted, by striking against the Bone, would be no longer able to make an End of the Operation: Besides, if the Ligature was so near the Bone, the Surgeon would run the Hazard of cutting it, by separating the Bone from the Flesh, as I shall say hereafter. And if the Ligature was too far from the Bone, he would run the Risk of passing the Needle through the Vessels, opening them, and occasioning a great Disorder; from whence it appears, that 'tis very proper to keep a Medium.

THE Needle being driven, as I have just now said, the Operator lets down the Patient's Arm to loosen the Skin ; afterwards he makes a Surgeon's Knot with the Thread, which he tyes very tight, and as soon as he has made that Knot, he sees whether the Blood be stopped, by feeling the Artery three or four Inches under the Ligature ; and, if he feels no Beating, he makes a second Knot above the first, and fastens the two Ends of the Fillet with a Loop.

WHEN he has thus stopped the Stream of the Blood, which ran into the whole Arm, he must preserve a great deal of the Skin, cut the Flesh, and extirpate the Arm. In order to do those three Things, M, *Petit* takes Notice of three Circumstances ; the first is to secure the *Acromion* ; the second, to draw the Skin ; and the third, to make the Incision, two or three Inches under the *Acromion*, in order to leave a greater Quantity of the *Deltoid*, and to fill up the Vacuity after the Operation, and by that Means to cure the Patient more speedily.

AFTER those Observations, the Operator uses a strait *Bistouri*, to cut transversely the Skin, the Fat, and the *Deltoid*, in the Place above - mentioned ; afterwards he gives a small Motion to the Arm, by raising it a little, and perceives the two Heads of the Muscle *Biceps*, which must be cut off with the same Instrument. And if during these Incisions some Arteries should emit a great deal of Blood, the Surgeon must stop it immediately, by applying a heap of Lint, kept on close by a Servant. During that Time, the Operator shall cut the circular Membrane which surrounds the Jointure, and will unbridle on both Sides, as much as may be. Afterwards he conveys the Fingers of his left Hand to the upper Part of the Head of the *Humerus*, and draws it a little.

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There with the *Bistouri* he unbridles and cuts the Sides that are cumbersome, and by that Means he is at Liberty to see, whether the Ligature of the Vessels be well made. In the next Place, the Surgeon must preserve the Skin, and the Muscles that are tyed with the Vessels; and therefore he cuts those Muscles longitudinally on each Side, and leaves a Shred of a triangular Figure, the Basis whereof lies towards the Arm-pit, and the Top remains blunt, square, and of a Figure adapted to the remaining Part of the *Deltoid*; so that after such an Operation, the Limb has no hold left.

SOME advise to make a circular Incision. I think the Method I have proposed is preferable, because when the Operator makes the Incision circularly, he runs a great Hazard of cutting the Ligature. But suppose that Accident should not happen, there would be a great Loss of Substance, which could not be cured but in a very long Time, and might occasion some Disorder; whereas, if we follow Mr. *Petit's* Method, there will remain two large Pieces, which may soon be reunited, and which might be sutured, when the Ligatures fall off.

THAT Amputation being made, the Surgeon must examine the Vessels adhering to the remaining Piece, and pass under them a Needle threaded with a Fillet, without the Skin. He ought to make that Ligature one Inch above the first, and make it tight, because it must stop the Blood. Afterwards he cuts the first Ligature, because it presses upon the Skin, and there might happen an *Erysipelas*, attended with sad Accidents, and even with Death.

To dress the Patient, the Surgeon lays a Plaget upon the Stump, and a Compress upon the Arteries, to preserve the Ligature. Afterwards he raises
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the remaining Piece of Flesh, and brings down that which remains of the Skin and the *Deltoid* Muscle; he fills up the Whole with dry Plagets and Heaps of Lint; and covers that Dressing with a Plaister made in the Form of a *Malta* Cross. Above that Plaister he lays a square and thick Compress; he puts a round Compress into the Arm-pit to compress the Vessels, that they may not drive the Blood with so much Impetuosity; He covers the Whole with a Compress like a *Malta* Cross, folded double. Above that Compress, he applies two large longitudinal Compresses, four Inches broad, and two third Parts of an Ell long; he applies the middle of the first obliquely upon the Dressing, and the foremost End comes over the opposite Shoulder, and the hinder End reaches four or five Inches under the sound Arm-pit: The second longitudinal Compress must also be applied obliquely upon the Stump, in such Manner, as to be crossed by the first. Lastly, he applies a third of the same Length, and somewhat broader, which covers the two first, and lies cross upon the opposite Shoulder. That Dressing is supported by the following Bandage, called *The descending Spica*. But before the Surgeon makes that Bandage, it is not improper to lay a small Cushion under the opposite Arm-pit, that the Turnings of the Roller may not compress the Vessels, and that it may the more commodiously serve for the Bandage.

Of the Descending Spica proper for the Amputation of the Arm in the Joint.

THE Surgeon uses for the *Descending Spica* a Roller with one Head, four Inches broad, and six and thirty Feet long: He applies the End of the Roller

Roller before the Breast, near the right Arm-pit; because I suppose the left Arm is to be cut off. He bids a Servant hold that End of the Roller in that Place, and conveys the Globe transversly upon the Dressing; and then, passing behind the Back, he comes under the right Arm-pit, to make an End of the Circular: He makes the same Turning a second Time; and when he is under the right Arm-pit, he ascends upon the *Acromion*, on the same Side; he conveys the Roller behind the Back, obliquely upon the Dressing, and comes under the right Arm-pit, passing over the *Sternum*; he ascends the *Acromion*, and comes before, to pass obliquely over the Dressing, and consequently to cross with the first oblique Turning, in order to form the first Folds of the *Spica*: He goes on with the same Circumvolutions, 'till the *descending Spica* be ended; and then, with the remaining Part of the Roller, he makes Circulars, which pass horizontally over the Dressing.

THE Patient is blooded two Hours after, and that excellent Remedy is repeated as often as is necessary. He is only nourished with Broth, and sometimes with a Spoonful of Jelly.

THAT new Operation was performed some Years ago, with good Success, upon the Marquis *de Coetmaden*, by Mr. *Le Dran*, assisted by the prudent Advices of Messieurs *Mareschal*, *Lapeyronie*, *Arnaud*, and *Petit*.

The END of the OPERATIONS.



A
 SHORT DESCRIPTION
 OF THE
 INSTRUMENTS

That are Used in

Chyrurgical Operations.



URGERY is an Art of a vast Extent; and yet it contains nothing that is useless: The very Instruments that are used in Chyrurgical Operations, ought to be thoroughly known. Surgeons do not take a sufficient Care to perfect them; they are hardly able to judge of their good or bad Construction, (especially in the Country) or of the Usefulness and Inconveniencies they may be attended with in the Practice. That Ignorance is frequently the Cause of great Faults; and many Operations have not a good Success, because the Instruments made Use of are defective: Nay, it happens sometimes, that Patients are not relieved, for Want of necessary and good Instruments.

FEW

FEW Authors have treated that Subject. *Guillemean* and *Scultet*, who enlarged upon it more than others, have done it so immethodically, that far from instructing us, their Books have brought into Contempt, among many Surgeons, those who invent new Instruments, or endeavour to perfect the old.

I should therefore be guilty of Rashness in believing that I can discourse of them better than the ancient Practitioners, were I not directed in this Matter by those excellent Masters, whose Advices I have followed in the whole Course of the Operations, which I have described.

I am indebted to Mr. *Arnaud* for the Order I shall observe in this Treatise. He is the first, who has demonstrated Chirurgical Instruments publickly ; he has set them in their best Light, and cleared that Subject, which had been handled before with great Confusion. I shall add to the Method and Discoveries of that great Surgeon, some Instruments of Mr. *Petit*, and Mr. *Lapeyronie*, and what my small Abilities afford me upon this Matter, together with the different Terms of the Parts of each Instrument, which I have learned of the best Artists, and particularly of the *Sieur Vigneron*, who excels in his Profession, and marks his Work with an *Ace of Clubs*.

We have two sorts of Chirurgical Instruments, some are Natural, and others Artificial. The natural Instruments of a Surgeon are his Hands, which ought to be neat and clean, rather long than short, steady, and both of them equally dexterous. Besides, the Joint of his Wrist ought to be steady, and the Phalanges of his Fingers pliant, and of a good Conformation. The Skin of the Fingers end,
especially

especially of the fore and middle Fingers, ought to be fine and nice for the Feeling. When a Surgeon can do without Artificial Instruments, the natural ones are preferable, because they answer his Intention more speedily and safely, and without any trouble. The Surgeon's Hands must also be directed by a good Sight.

ARTIFICIAL Instruments are used by a Surgeon, when his Hands are not sufficient. They consist of different matters; but generally of Iron and Steel, some are made of Gold, Silver, Lead, and other Matters. It is absolutely necessary that some Instruments should be made of Iron and Steel, or both together, such as those, which ought to make a great Resistance, or cut with their Edges, &c. Others require to be made of Silver; such are pliant Instruments, the *Catheters*, the *Cannulas*, and some *Siphons* very small, &c. But many others may be made indifferently of Iron, Steel or Silver; and this last Metal is frequently preferred to others only for the sake of Neatness.

To give a particular Description of each Instrument, I shall reduce them all to three Classes. The first contains those, that are used to prepare the Dressing; the second, those which ought to be made use of to dress Wounds; the third, those that are useful in the several Operations of Surgery, or peculiar to them.

The Instruments of the first Class are but few, *viz.* a Needle, Thread, Scissars, and a *Spatula*.

To give a just Notion of each particular Instrument, I should begin with a Definition; which is no easy thing, since no Body has done it hitherto. Besides, there are some Instruments, which not being capable of a true Definition, can-

not be well explained without a large Description ; and others are so well known, that a Definition, or a Description, would only darken the clear Notion we have of them : However, I shall endeavour, as much as I can, to give at first an Idea of each Instrument, and then consider all its Parts, and its several Uses.

THE *Needle* in general is a small Rod of Steel, or some other Metal, pointed at one End, and bored through at the other, to pass into it some Thread, Silk, or some other Tye ; and it is used for sowing, embroidering, &c. I shall hereafter give a more particular Account of Needles ; for this is not a proper Place to mention those that are made Use of in Operations.

THE usual Needle serves in the Dressings to sew together the Ends of Rollers, and the Folds of Compresses, and to join several Pieces of Linnen, in order to make compounded Bandages.

THE *Thread* is a Collection of long and thin Filaments, taken from the Bark of Hemp, Flax, &c. twisted between the Fingers with a Spindle, or with the Help of a Spinning-Wheel. There are several Sorts of *Thread*, as I have shewed, discoursing of Sutures ; but that which we use to prepare Dressings is made of Hemp : It is commonly called *Bretagne Thread*, and known in this Province by the Name of *Twisted-Thread*.

Scissars are an Instrument of Steel and Iron, consisting of two cutting Branches, which are joined together by a Nail : Some compare *Scissars* to two Knives applied upon one another, to cut whatever happens to be within the Space of their Edges. The cutting Part represents the Blade of the Knife, and the other Part the Handle ; but those two Parts
joined

joined together are looked upon by Artists as a Branch ; as I have said in the Definition ; and because there are two Branches in *Scissars*, the one will be the upper, and the other the lower. I call the upper Branch that which lies under the Cloth when it is cut, and the Ring whereof must be held by the Ring-Finger. On the contrary, the lower is that, the End of which, either buttoned or blunt, as I am going to shew, must be upon the Cloth, and the Ring whereof is held by the Thumb.

THE hinder End of each Branch consists of a Ring, which ought to be somewhat long, to adapt itself to the Figure of the Fingers, and flat in its whole Circumference, that having a larger Surface, the Fingers may act upon it with more Strength. Surgeons must take Care to get the Rings of their *Scissars* made suitable to their Fingers ; for Workmen generally make them much of the same Size, and therefore some Fingers being very large, can hardly get into the Rings, which is no small Constraint in the Operation ; and others are so small, that the Rings moving to and fro about the Fingers, render the Action of that Instrument unsafe.

THE Part next the Ring is what I call the Handle ; its Figure represents an irregular Cylinder ; it may be of Silver, as well as the Ring in those *Scissars*, that are designed for the Dressing, but in those that are to be used for an Operation, the whole Branch must be of Steel.

THE Handle ends with an Hexagon Figure, exactly Symmetrical from one Branch to the other ; Workmen call it the Shoulder. They contrive in the internal Part of that Shoulder in each Branch, a considerable Depression, which joining with the

other Branch, does not form a Bulk more raised than the Handle : Workmen call that Junction.

THE Nail, which is the fixed Part of the Scissars, and keeps the two Branches against one another, ought to be fixed upon one of the Branches, that it may support the other to move more regularly ; to that End, one of the Branches must have a smaller Hole, or the Nail must be larger in that Place : If this Mechanism was not observed, and the two Branches should waver alike upon the Nail, the Motion of the Scissars would be irregular, and consequently their Action more unsafe.

WHAT follows from the Shoulder to the foremost End of the Scissars, is called the Blades, as I have already said ; they must be flat in the Inside, and convex on the Outside, that the whole Strength may tend to the Inside : The two Blades of the Scissars must not be very far from one another, because they would not cut what happens to be between their Edges ; they must be neither too close, nor, as it were, crooked in the Inside ; for the Edges would get upon one another, and notch one another. Lastly, the Blades of the Scissars, designed for Dressings, end differently, *viz.* the upper Blade with a very sharp Point, and the lower with a blunt Point, or a Button, to slide under the Cloth, that is to be cut, and to prevent piercing it, which would happen with a sharp Point.

I look upon Scissars as a kind of Lever, the Power whereof is in the Rings, the fixed Point in the Nail, and the Weight in the Edge of that Instrument ; so that the farther the Power is from the fixed Point, the stronger will the Instrument be.

THE Use of Scissars, proper for Dressings, is to cut the Threads, the Fillets, the Plaisters, the Compresses

presses, the Cloth, and whatever is more than is wanted; but to make a good Use of them, the Surgeon must put his Thumb into the lower Branch, and the Ring-Finger into that of the upper Branch, for some Mechanical Reasons, too long to be here inserted. Afterwards, if the Surgeon cuts, for Instance, some Linnen, he puts the blunt, or buttoned Branch underneath; he lets down the Wrist a little to raise that buttoned Branch, that it may take in the Linnen in its whole Extent; and then he cuts the whole Linnen with the Scissars all at once.

THE *Spatula* is a small Instrument, somewhat long, flatted, and round at one of its Ends, to spread Unguents.

THE *Spatulas* may be of Iron or Silver; the latter are neater, and the former stronger. *Spatulas* in general are of different Figures; but the most regular are like a small Lever, one End whereof is flat, and round at the End, and the remaining Part of that Instrument lessens more and more, as far as the other End, which is somewhat crooked, and provided with small transversal Grooves, like an Elevatory.

THE Use of the flat and round End, whereby the *Spatula* is distinguished from other Instruments, consists in spreading the Plaisters upon Linnen, or Leather, and the Unguents upon the Plagets, and sometimes upon the affected Part; but the opposite End serves to raise Pieces of Bones displaced, or fractured, in any Part whatsoever.

THE Instruments of the second Class, for the Dressing of Wounds, are of two Sorts: Some are proper to dress the Outside of Wounds, and others are used to dress the Inside. Those of the first Kind

are not many. We reckon among those Instruments the *Myrtle-Leaf* and the *Razor*.

THE *Myrtle-Leaf* is a small Instrument, pretty like the *Spatula*, only with this Difference, that the *Myrtle-Leaf* is narrower, and ends with a Point. That Instrument has been so called, because it is somewhat like the Leaf of a Myrtle-Tree. There are several Kinds of it, by reason of those Things that are added to its other End; for Surgeons add to it sometimes a Pincer, which serves to dress Wounds, and to dissect; sometimes a Spoon to take a Ball out of a Wound; and sometimes a small flat and round Button, called *Meningophylax*, which is used to press upon the *Dura Mater*.

THE *Myrtle-Leaf* serves to clean the Edges of a Wound, and to remove the Filth gathered therein by Plaisters, or by the *Pus* coming out of the Wound. Some Surgeons use that Instrument, as if it was a *Spatula*; but far from approving of that Method, I am very much against it; for a Surgeon, who ought always to dress a Wound as neatly as he can, must not take Unguents, and spread them upon Plagets, and even in the Wound, with an Instrument designed to remove the Filth out of it.

THE *Razor* is so well known, that I need not describe it; I shall only give an Account of the Usefulness of that Instrument in the Dressings; it is used to shave the Hair growing about a Wound, and even to take off the Filth which the *Myrtle-Leaf* could not remove, and to uncover by that means, the Pores of the Skin, in order to promote its Transpiration, and preserve it from the acrimonious Impressions which that Nastiness might occasion. This is of no small use for the cure of a Wound. The *Razor* is also used to shave the
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Hair of those Parts, upon which emplastick Remedies are to be applied, that the Patient may not suffer any Pain, as he would when the Hair is plucked out by taking off those Remedies. Young Surgeons must not neglect the Use of the Razor, for it will very much contribute to make their Hands more pliant and nimble.

LASTLY, The Instruments of the second Kind, which serve to dress the Inside of a Wound, are in greater Number, and the Probe is the most considerable.

BY the Word *Probe*, we mean a small Rod of Iron, Steel, or Silver, blunt, or with a Button at the end of it, to prevent hurting the Patients, and which is introduced into a Wound to know its Depth, and those Parts that are affected.

AMONG those Probes that serve to discover the Depth, the Meanders or different Complications of a Wound, the Silver Stilets are the most convenient, especially when they are nealed, because the Surgeon may bend them, and give them such a Figure as is requisite for the different Windings of the Sinuosities of Wounds or *Fistulas*. It is usual to add to one of the ends of certain Iron Probes, or Silver Stilets, an opening somewhat long, and like that of Needles, wherein there are two small Grooves, one on each Side of the Opening, to pass a *Seton* through the Wounds, or to serve for some other Operation.

The second Instruments proper for dressing the Inside of Wounds, are the *Forceps*. 'Tis a small Instrument of Iron, or Silver, consisting of two Branches, which is used to take or place some Things which could not be taken or placed so easily with the Fingers. Those two Branches are differently

shaped in the middle ; one of them is flat, and made thin, the other is wider and slit. The first enters into the Slit of the second, and is therefore called the Male-Branch by Workmen ; and the second Branch goes by the Name of Female, by reason of its Slit. The Union of those two Branches is called an Inside Joint.

Forceps's in general, are different in Size and Figure ; but those that are commonly used to put some Parts of the Dressing into the Wounds, are of two Sorts. The first is a double *Forceps*, the Ends whereof are kept asunder by the help of a Spring. Those *Forceps's*, as well as those that are clapped upon the end of some Myrtle-Leaves, can hardly be of use but in superficial Wounds.

THE second Sort of *Forceps*, consists of two Branches, as well as the first ; but it differs from it, because in its hinder Part there are two Rings, like those of Scissars. Those Pincers are preferred to all others, not only because they are absolutely necessary to dress deep Wounds, but also, because they are more able to take out extraneous Bodies, and may also be of use in superficial Wounds.

ALL the *Forceps* that are used in Surgery, must have in the inside some Unequalities, Cavities, or Slits at the foremost End of their Branches, as I shall say hereafter ; but their Unequalities are different, according to their several Uses. For Instance, those Pincers that must convey some thing into a Wound, and take it out, must have oblique Unequalities, crossing one another, like those of Files ; it is also usual to make them transversal and parallel. Those which are design'd to compress some Parts of the Body, such as the *Forceps*, which serve in the Suture of the Tendon, have longitudinal Unequalities ;

ties ; and those that serve to take out some extraneous Bodies, must also have different Unequalities, according to the kind of the extraneous Body.

THE third Instrument made use of for the dressing of the Inside of Wounds, is the *Syringe*.

By that Word we mean a round and long Vessel, and consequently of a cylindrical Figure, which serves to pump Liquors, and to convey them into deep Places, whither they cannot come but by this Means.

THE *Syringe* consists of three Parts, *viz.* Its *Body*, its *Sucker*, and its *Siphon*. The *Body* of the *Syringe* is a hollow Cylinder, which must have a sufficient Diameter ; for, if that Cylinder was very long, two Hands would be necessary to drive the Liquor into the Wound, since the Ring of the Sucker would be too far from the Body of the *Syringe*, which is commonly held with the fore and middle Fingers, the Thumb being in the Ring of the Sucker ; the Breadth of the *Syringe* is also of use to contain more Liquor. Lastly, That Cylinder must be very smooth in the inside, that the Sucker may slide more easily ; but it must have in the outside some Unequalities, like small Circles, to hold it more steadily.

THE *Sucker* of the *Syringe* is a kind of Handle, consisting of the same Matter as the Cylinder, and its Ends are different. The foremost End, or that which goes into the Cylinder, consists of two round Circles, which are at a greater or lesser Distance from one another, according to the different Length of the *Syringe*. The Space contained between those two round Circles, is filled up with Hemp, which serves as Felt, to fill up the Vacuity exactly, and to pump and drive the Liquor more perfectly. The
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hinder End, or that which must remain out of the Cylinder, is of different Figures. Some put to it a Button, others a Ring: The Ring is more proper, because the Thumb being in it, it cannot move to and fro, as it happens when the Thumb is upon the Button.

THE third Part of the *Syringe* is the *Siphon*. It is a small Tube, the Basis whereof is broad enough, and it ends by Degrees with a Point, being like a Pyramid; that Tube is frequently soldered upon the Middle of the foremost End of the Cylinder, and sometimes it is screwed upou it. These Tubes are essential to a *Syringe*; they must be of different Figures and Sizes, according to the different Parts, and different Diseases. But besides those Sorts of Siphons, a Surgeon must have several other Kinds of them; and these are called auxiliary Siphons, because they are added to the essential ones, in order to convey the Remedies into deep and winding Ulcers, and to pump out the purulent Matters and Injections, it being certain that such Abscesses and Impostumations cannot be cured, unless the Remedy be conveyed into the very Seat of the Disease, and the End of the Siphon lie within the Matters, to pump them out more easily and exactly.

It appears by this Description, that those auxiliary Siphons must be of different Sizes, according to the Length of the *Sinus's*, and that they must have different Figures, according to the different Windings of those Sinuosities. It is therefore absolutely necessary that they should be so made as to resist and yield to all those Figures, like Silver nealed: Their End, which ought to be adapted to the essential Tubes, must be somewhat broader,
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and like a Funnel, to contain exactly the pyramidal End of the Siphon, or essential Tube of the *Syringe*, and the opposite Extremity shall be open by Orifices in the Sides, that the Surgeon may unstop those Siphons, by introducing a small Stilet into them.

THE fourth Instruments that are used in dressing the Inside of Wounds, are the *Cannulas*.

By that Word we mean a small Tube of Gold, Silver, Pewter, or Lead, which is put into a Wound to keep it open, and facilitate the Issue of stagnating Matters. *Cannulas* in general, are of different Kinds and Figures, according to the Places wherein they are used: For Instance, that which is used in the Operation of the *Bronchotomy*, is, as I have said, very small and flat: Those that are introduced into the Bladder after the Extraction of the Stone, or the Punction in the *Perinæum*, are solid or pliant, of a cylindrical Figure, and about four Inches long, having at their Head two small Handle-loops, into which they pass a String to keep them steady in the Wound. The *Cannula* made use of after the Operation of the *Empyema*, is commonly two Inches long, more or less broad, according to the Size of the Orifice, flatted to adapt it self to the Interval of the Ribs, and crooked to avoid the Lungs. I have shewed the Uselessness and Disadvantage of this last *Cannula*, discouraging of the *Empyema*. If the *Cannulas* in general are too long, Surgeons don't advise to cut them in order to make them shorter, but to use a small Linnen Compress, more or less thick, according to the Length of the *Cannula*, and to pierce that Compress in the middle, in order to let into it the *Cannula*, which will rest upon it.

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I have placed under the third Class of Instruments, all those that are used in Chirurgical Operations: Most of those Instruments serve to make Divisions, and are reduced to two Classes; the first contains those that are made use of in the Operations proper for the soft Parts, and those that serve in the Operations upon the hard Parts.

THE Divisions we are obliged to make with those Instruments, are generally attended with great Pains; and the Patients being afraid of those Pains, do frequently lay aside the Operation, and give up themselves to a medicamental Surgery, the Success whereof is very uncertain. We see every Day a considerable number of Patients, who trusting Quacks, or timorous Surgeons, little acquainted with Anatomy, and unable to make any Observation upon particular Cases that occur in Surgery, live a lingering Life, and continue under their Illness. On the contrary, a good Surgeon is fully perswaded by his Skill in *Anatomy*, by his own Experience, and that of the great Masters, that of all Remedies, the Operation, and consequently the *Instrument*, is the most speedy and the safest.

SINCE we reap so many Benefits from those Instruments which are used in the Operations of Surgery, I shall give as exact a Description of them as I can; and because I have said, that those Instruments divide the soft Parts, or the hard ones, I shall first discourse of the former, and then give a Description of the latter.

THE Instruments of the first Kind are of two Sorts: Some are applied upon the dead, and others upon the living; the former are used in Dissections, such as the *Scalpels*, and many others, which Anatomists make use of.

THE Instruments of the second Kind are placed under two Classes: The first Class contains those that are used in most Operations; and the second, those that are peculiar to each Operation, as I shall shew hereafter.

THE Instruments used in all Operations, are Probes, Bistouris, Lancets, Scissars, and many others, which I shall name in their proper Places.

Among Probes, some are round, and have a Button at the end, as I have shewed before, and others are grooved in their whole Length, and a Surgeon ought to have two Sorts of these last Probes, some stopped at the end, which must get into the Wound, and the others open, to be adapted to the different Incisions which the Surgeon is oblig'd to make: For when he can introduce the grooved Probe into a Wound or a *Sinus*, he must generally use those that are stopped at the end; I say, generally, because he is sometimes obliged to make Incisions, wherein the cutting Instrument must be higher than the Groove of the Probe, and then the Probe must be open at the end, that the cutting Instrument may not be stopped in it. But there are frequently *Sinus*'s, of which the external Orifice is so narrow, that a small Stilet can hardly get into them. In such Cases, the Probe grooved and open at the end is of great Use, as I have shewed by one Instance, discoursing of the *Fistula in Ano*.

THE *Bistouri* is a kind of sharp Razor, that is used by Surgeons to make Incisions.

I shall speak of the two Parts of that Instrument, *viz.* the Blade and the Scale. The Blade of the *Bistouri* must not be above four Inches long, and five or six Lines broad towards its Tongue, which is pierced to let a Nail into it, that goes through

through the two Blades of the Scale, and is rivetted on both Sides upon two small Eyes. In the hinder Part of the Tongue of the *Bistouri*, there is a Tail, ending with a small Button, to fasten the Blade upon its Scale; that Blade lessens by degrees from its Tongue to its fore-part, so that in some *Bistouris* it ends with a very sharp Point, and in others with a blunt one. All *Bistouris* have their Back rounded, a Bevil on both Sides of the Back, and then a considerable Hollow on both Sides of the Blade, to end with a very fine Edge. A Surgeon must have some *Bistouris* strait, and others crooked, for when they are too crooked, they are inconvenient. Lastly, A Surgeon must have sharp and blunt *Bistouris* of both Kinds.

THE Scale consists of two scaly *Laminae*, much like the Figure of the Blade; they are joined together at their Ends with riveted Nails.

THE Use of the *Bistouri* is to make Incisions in most Parts.

BY the Word *Lancet*, we mean a Chirurgical Instrument, very sharp at the farthest end from the Scale, and cutting on the Sides of its Point, serving to open Veins, Arteries, Abscesses, &c.

THE Lancet consists of two Parts, a Blade, and a Scale or Handle. The Blade is pretty like the Figure of a Pyramid, the Point whereof is very acute; that Point must be very smooth to an Inch of its Body; and the two Sides of that smooth Part must be very sharp. The whole Basis and Middle of the Blade, are generally neither smooth nor sharp on the Sides, that the Surgeon may keep the Lancet more steadily, and not run the hazard of cutting his Fingers, as he would do if it was smooth every where, since it might slide, and the Edges would hurt him.

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THOSE Blades in general are of different Sizes and Breadths. There are four Sorts of Lancets; the first is called a full pointed Lancet, its Blade begins to lose its Breadth only very near the Point, and therefore it is very broad, and can make a large Opening, by driving the Lancet into the Vessel; and therefore a Surgeon ought to prefer it to the others as much as possible, especially in superficial and large Vessels, for which it is always proper. The second Kind is called a Spear-pointed Lancet, that is, its Point is longer than that of the first, and generally begins about the middle of the Iron; this sort of Lancet is proper for those Vessels that are of some Depth. The third Kind is called a Pyramidal Lancet; this begins to lose its Breadth at its Basis, I mean near the Nail, so that lessening by degrees, it ends with a very long and sharp Point, like a true Pyramid. Such Lancets must never be used by Prentices, because they are only proper for the deepest Vessels, and unless a Man has a steady Hand, and knows how to use them, he may do much Mischief.

ALL the different Kinds of Lancets just now mentioned, may be of use to open Abscesses, when they are superficial, and consequently there are but few Parts to cut. But when they happen to be deep, a Surgeon must use the fourth Sort of Lancet, which differs from the others only, because it is much broader and longer, and therefore it is called an Abscess Lancet.

THE Scale of the Lancets does generally consist of two small Pieces of Tortoise-Shell joined together, the Tongue of the Blade in the middle, by a Nail that goes through those three Pieces, and is riveted on both Sides upon two small Rivets,

vets, for the more Neatness and Security. That Scale is not stopped at the opposite end, that it may easily be opened and wiped on all Sides.

A Surgeon ought to be very careful of his Lancets, and get them set as soon as the Point is not very sharp, and the Edges very fine; for when the Point is a little blunt, and the Edges do not cut finely, the Patients feel much Pain, which makes them withdraw their Arms, especially when nothing yet but the Skin is pierced. That small Motion does frequently remove the Vessel from its Place, and then a wise Surgeon, who has Anatomy present to his Mind in all his Operations, particularly in this, which requires not only a great Dexterity, but also an exact Knowledge of the Part about which he is concerned, thinks it more proper to go away without looking for the Vessel with his Lancet, than to run the hazard of opening an Artery very often in its Trunk, of pricking an *Aponeurosis*, a Tendon, or a Nerve, and thereby occasioning violent Pains, great Abscesses, the Loss of the Arm, and frequently of Life itself. The celebrated Surgeons, whom I have so often quoted, observe that Rule, and I have seen several Practitioners who did not scruple to bleed in another Arm or Foot, or to take off and put on again the Ligature, in order to give a second Stroke with the Lancet. Those great Anatomists and Surgeons, are very different from those, who being ignorant of the Structure and Mechanism of the several Parts of the human Body, are extremely well pleased to see a Surgeon fail drawing Blood, that they may run down a Person whose Merit they are not so much as able to understand.

SCISSARS are also an Instrument made use of in many Operations. I might be dispensed with from saying any thing more about them, since I have defined them, and carefully examined the several Parts of which they consist: However, because those that are proper for Operations have essential Differences, I shall say something of them.

I have observed, that those Scissars which are used in the Dressing, might have silver Rings, and a silver Handle: In this Case it is the quite contrary; they must be made of Steel, to be stronger: Besides, the *Scissars* proper for Operations ought to be crooked or strait, as occasion requires. The crooked ones are always blunt at their Ends; but the strait ones are more or less sharp-pointed, as occasion shall require: For Instance, when the Surgeon must cut evenly, in certain Places, as in the Hare-Lip; or scarify *Callosities*, as it frequently happens, in Abscesses, and *Fistulas in Ano*, he must then use sharp-pointed *Scissars*; in most other Operations the Blades must be blunt.

HAVING described Part of those Instruments, which are used in most Operations, I shall now treat of those that are peculiar to each Operation; and to do it without any Confusion, I shall observe the same Order which I have followed in the *Operations*. I began with the Reunion of Wounds; and before I shewed how it might be effected, I took Notice of several Obstacles which prevented that Reunion; wherefore there are two Classes of Instruments proper for the Reunion of Wounds, some are of Use to take out extraneous Bodies, and others to bring the Lips of the Wound near one another.

AMONG extraneous Bodies, some are superficial, and others in a deeper Situation; the superficial

ones are frequently Small-shot in the Face, or elsewhere, Grains of Powder, or many other Bodies of that Nature. To take out those extraneous Bodies, a Surgeon must have a small Instrument, called a *Scoop*.

By that Word we mean an Instrument of Steel, Iron, or Silver, like a small Spoon, and made Use of to take out extraneous Bodies, sunk into some Parts, or to cleanse some hollow Places, the Orifice whereof is not very considerable. This Definition does sufficiently shew the Construction of that Instrument; and therefore I need not describe it: I shall only say, that a Surgeon must have *Scoops* of several Figures, *viz.* round, of the shape of an Olive, and long ones, that they may be adapted to the different Figures of Wounds and extraneous Bodies. Some Surgeons recommend small *Scoops*, sharp on the Sides, to take out some Grains of Powder, that are sometimes in the Skin of the Face. I own that since they design to perforate the Skin, in order to convey the *Scoop* behind the extraneous Body, they avoid, by that Method, using many Instruments: But because the Edges of the *Scoop* are only of Use to cut the Skin a little, and prove hurtful to take out the extraneous Body, I think it is much better to use *Scoops* without Edges to take out the extraneous Body, and to cut the Skin with the Point of a *Lancet*.

WHEN the extraneous Bodies lie deep, the Surgeon must know whether they are in the soft or solid Parts; if they are in the soft Parts, he takes them out with *annulary Forceps's*, above-described, taking Care to convey the *Forceps* into the Wound, to touch the extraneous Body with the *Forceps* shut; and then to open theE gently, and remove the extraneous

neous Body. Surgeons use also several other Sorts of *Forceps's* to take out extraneous Bodies, that lie deep in the soft Parts ; such as the *Duck-bill'd*, the *Crow-bill'd*, and the *Crane-bill'd Forceps's*. Those three Instruments are made much in the same Manner ; one has its foremost End blunt and flat ; the other more pointed and rounded ; and the third, very long ; whence their different Names are derived ; and therefore it will be sufficient to describe one of those Instruments.

THE *Duck-bill'd Forceps*, is a Chirurgical Instrument, to take extraneous Bodies out of a Wound. Since that Instrument is made like a Pair of Pincers, it follows that it consists of two Branches. Both Branches are rounded, and pretty long from the Nail, whereby they are fastened together to their hinder Part, wherein one may fasten Rings to have more Strength. From the Nail to the foremost Part, those Branches are like two small Spoons lengthened, very crooked, flat and blunt at the End ; a Figure not much unlike that of a *Duck's Bill*.

I have said, That the Branches of that Sort of *Forceps's* were very long from the Rings to the Nail, and very short from the Nail to the foremost End ; so that by such a Mechanism, the Power being at a great Distance from the fixed Point, it follows from hence, that the Force of the Instrument must be very great.

WHEN I gave an Account of *Forceps's* in general, I said they must have in the Inside different Unequalities at the foremost Part of their Branches, to answer the different Uses they are put to ; and because this kind of *Forceps* is made use of to

take out extraneous Bodies that lie deep, and even in the Bones, its Unequalities or Grooves, must be like a Grater, to secure the Body that is to be taken out.

THE *Duck-bill'd*, *Crow-bill'd* and *Crane-bill'd Forceps's*, differ only by the different Figure of the foremost End of their Branches, and by their being longer or shorter. The Use of those Instruments consists, as I have already said, in taking out extraneous Bodies that lie deep in Wounds. I must observe, that all those Instruments are naturally opened by a Spring.

WHEN the extraneous Body is in the hard Parts, such as the Bones, and the Instruments just now mentioned are not sufficient to take it out, Surgeons use another Instrument, called a *Piercer*.

IT is an Iron, or Steel Ring, with a long Bodkin, which ends by a simple Screw like a Pyramid, called a *Match* by the Artists. That Bodkin is generally concealed in an Iron *Cannula*, at the Entrance of which there are inwardly spiral Grooves to make way for the Screw of the Bodkin: They contrive in the Neck of the Bodkin a double Screw, an Inch long. The Bodkin must reach one Inch at least beyond the *Cannula*, that it may get into the extraneous Body. If the extraneous Body was, for Instance, a Piece of Iron sunk into the Bone, 'tis plain the Instrument just now described, could not pierce it, as it would a leaden Ball. In such a Case, the Bone should be trepanned in the adjacent Parts of the extraneous Body, and some Elevatories, or other Instruments, should be laid under it to take it out.

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WHEN the extraneous Bodies are out of the Wound, the Lips must be brought together as near as possible: That Re-union is called *Suture*, and the Instruments subservient to it, are commonly *Needles*.

THE *Needles* used in the Sutures and Ligatures of the Vessels, are many, and of different Figures, according to the different Sutures, and the different Parts.

I have already given a general Definition of *Needles*, and therefore to avoid Repetitions, I shall only mention the different Parts of which they consist. Every *Needle* in general has three Parts, its Head, its Body, and its Point: The Head ought to be less bulky than the Body, and the latter must be less broad at its beginning, than towards its end. There are commonly two Grooves in the Head of *Needles*, one on each Side; and they are longer or shorter, more or less deep, and more or less broad, according to the different Sizes and Dimensions of *Needles*, and the Bigness of the Threads or Fillets that are in part to be contained in the Grooves. From whence it ought to be inferred, that those Grooves are only designed to contain part of the Threads, that they may not much encrease the Bulk of the *Needle*, and that they may more easily pass into the Flesh without pulling it. There is in the middle of those Grooves an Opening somewhat long, which goes through the *Needle*.

THE Edges of *Needles* must generally be on the Sides, and in the same Line as the Eye and the Grooves, because the Edges having made their Openings on the Sides, the Threads which are in the *Needle's* Eye find a large Way, and pass through the Flesh easily, and without any pulling.

BESIDES what I have just now said about *Needles*, they have also different Figures, according to the different Parts they are to go through. For Instance, those *Needles* that are proper to make Sutures in the Body of the Muscles, and Ligatures in the Blood-Vessels, are generally crooked, like a Bow, and longer or shorter, according to the Depth of the Wound. Wherefore Surgeons must have *Needles* of three or four different Sizes, and two of each sort, that they may make an end of the Operation, if one of them should break. Those that are proper in the *Gastrorrhaphy*, are differently crooked, as I have said discoursing of that Operation. The *Needles* proper for the Suture of a Tendon, have only one Edge, which is not on the Side, like those just now mentioned, no more than the Grooves and the Eye, as I have observed in the Chapter concerning the Suture of the Tendon. The *Needles* used for the Hare-Lip, are all strait, their Head and Body are perfectly round, but their Point is a little flatted and keen on the Sides, to cut as they pierce, and consequently to get in with more ease. The Eye of those *Needles* must be on the side of the Edges, for the Reasons already mentioned.

MOST of those *Needles*, which I have just now described, being commonly very small, and consequently because they give no great hold to Surgeon, it is usual to add to them some other Instruments, whereby they act more steadily.

THOSE Instruments are of two Sorts; one is proper for the right Hand, and the other for the left: The first is called a *Port-Needle*, and the second have different Names according to their Figures, their
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Uses, and the different Operations, [to which they are apply'd.

THE *Port-Needle* is nothing else but a small *Forceps*, the Branches whereof are closed with a Ring, which serves to give the Needles a greater Length, and consequently to facilitate their Action, when they are too small.

THAT Instrument consists of three Parts, *viz.* an Iron or Steel Stem, split at one End, and hollow in the Inside, like a Funnel, to lodge the Head of the Needle. I must observe that the Grooves, which serve to lodge the Head of the Needle, ought to be broader towards the Bottom, than at their Beginning, to keep the Needle steady. However, I shall say, that such a Caution is often very useless; therefore Surgeons surround the Needle's Head with Linnen or Paper, to serve as a Felt to keep the Needle steady. The ingenious Mr. *Petit* puts some Lead into those Grooves, and by that Means, without any Trouble, answers all the Intentions. The second Part of the *Port-Needle* is an Iron Ring, with which they keep tight the splitted End of the Stem, just now described, to bring its two Branches near one another, in order to keep the Needle fast. Mr. *Lapeyronie* adds some Wings to that Ring; and they are the more necessary, because it is often so straitened that it cannot be loosened. The Surgeon is then obliged to draw the *Needle* before the Operation be ended, which is inconvenient to the Patient and to himself. But when Wings are added to the *Needle*, they make it more apt to grow loose.

THE third Part of the *Port-Needle* is the Handle, like a small Apple; it may be of Silver, and must have small Holes upon its hinder Part; which,

as well as those of Thimbles, serve to drive the Head of the *Needle* ; the Stem, with its Ring, ought to be fastened to the Handle with the help of a Screw.

THE Use of the *Port-Needle*, consists in holding fast the small Needles, to use them more easily, and drive them with the small Holes that are in the hinder part of the Handle, when they are not far enough, as I have already observed.

THE Helps proper for the left Hand, are two Instruments, usually fastened to the same Stem ; one is a Silver *Cannula*, in the Shape of a Ring, flat on that side which must touch the Parts upon which it is to be applied, that it may be more steady. That *Cannula* is open in its upper part to let in the Threads, without being obliged to convey the *Cannula* all along the Skane or Fillet. The Use of that *Cannula* is to keep fast the Lips of a Wound when they are to be sowed, by resisting the Force of the Needle that is to go through them, as I have said in the Operation of the Hare-Lip.

’TIS usual to put a *Forceps* at the other end of the Stem of that *Cannula*, the two Branches whereof are kept asunder by their natural Spring, but a square Ring brings them together to squeeze the Part. They contrive at the internal end of the Branches of that *Forceps*, some longitudinal Unequalities, the better to compress the Tendon when it is sutured. I have shewed the Disadvantage of that Instrument.

THE first Operations I have described, next to the Sutures, are the *Hernias*, the *Paracenthesis*, and *Hydrocele*.

THE Instruments peculiar to the *Hernias*, are those that are proper to dilate a Constriction. I have

have discoursed of all those Instruments, but I have not described the *Bistouri* for *Hernias*.

THAT Instrument is made up of two main Pieces, *viz.* a crooked, Iron *Cannula*, and a *Bistouri* likewise crooked; that *Cannula* is pretty large towards its hinder part, and lessens by degrees to end with a very blunt Point. All along the upper part of that *Cannula*, (I mean in the hollow part) there is a large Groove, which serves to lodge the *Bistouri*. The hinder Part of the *Cannula* ends with a Tongue that goes through a Handle, and is stopped upon it with the help of a flat Screw. The Handle is made of Ebony or Ivory, turned, pretty large, and in the Shape of a small Apple.

IN the Cavity of the *Cannula*, on the side of the Handle, there is a Steel-Blade, double and elastick, the lower Part whereof is shorter than the upper one, and tied to the *Cannula* with the help of a flat Screw, which is turned in the lower part of the Instrument, whilst the upper Part of that same Blade is tied to no Part at all. It appears by this Description, that the lower Part of that Blade is unmoveable, by reason of the flat Screw which fastens it with the *Cannula*, and that the upper one is moveable, since nothing stops it, so that it may go down when pressed, and it rises of it self by its elastick Quality, when 'tis no longer pressed: This is what Artists call a Double Spring. There is also another way of fastening that double elastick Blade, or that double Spring, *viz.* by not conveying the large Groove that must lodge the *Bistouri*, as far as the Handle, and to contrive between the Olive-like Eminence, which I am going to describe, and the Handle, a Mortise narrower at the Entrance than at the Bottom, that it may receive

ceive a Tenon broad in its Basis, and narrow in its Neck, which is in the lower part of the lower Blade of the double Spring ; that Junction is known among all the Mechanicks, by the Name of a *Swallow's Tail*, and it is the safest and the most steady. Besides that the Tenon and Mortise are like a *Swallow's-Tail*, that double Spring is also fastened with the flat Screw already described.

THERE is also in the cavity of that *Cannula*, and at the end of the lower part of the elastick Blade, which I have just now described, an Olive-like Eminence, upon the hinder part of which there is a pretty deep Groove, wherein the Tongue of the *Bistouri* is lodged.

THE second principal Piece of that Instrument, is the *Bistouri*, properly so called, consisting of two Parts, its Blade and its Tongue. The Blade of the *Bistouri* for *Hernias*, is made like that of crooked *Bistouris*, which I have already described; it has also a round and smooth Back, the Bevil, a Hollow, and an Edge. However, there is a considerable Difference, for this Blade is much narrower than that of the common *Bistouris*, that it may be exactly concealed in the large Groove of the *Cannula*. The second Part of the Blade of the *Bistouri* for *Hernias*, is the Tongue, bored through like all other *Bistouris*: It is fitted to the deep Groove of the Olive-like Eminence of the *Cannula*, and stopped there by a Rivet which goes through the *Cannula*, the Olive-like Eminence, and the Tongue of the *Bistouri*; a Mechanism, which makes up a Hinge. There is in the hinder part of that Tongue, a small hollow Tail in the middle of its upper Part, and convex in the lower one; it widens by degrees, to form a flat and smooth

Blade,

Blade, of a Figure almost oval, and about one Inch broad; the Surgeon leans his Thumb upon that Blade, whence it is called *the Thumb's Piece*: When he leans his Thumb upon that Blade almost oval, it must, according to the Description I have just now made, come near the Handle, the convex Part of the Tail of the Tongue must press upon the moveable Part of the Blade, and the sharp Blade of the *Bistouri* must come out of the *Cannula*: But as soon as the Surgeon ceases to lean upon the *Thumb's Piece*, the moveable Part of the elastick Blade rises swiftly, and consequently raises with the same Swiftness the convex Part of the Tail of the Tongue, and turning up quick, the sharp Blade of the *Bistouri* forces it to retire with the same Swiftness into the Cavity of the *Cannula*.

I have said, that all the Screws contained in that Instrument ought to be flat, that is, they must not jut out above the Instrument, but be smooth in that level. However, I must observe, that a small Notch ought to be contrived in the middle of their Head, to unscrew the Instrument with a Turn-Screw.

THE *Trois-Quarts* is the only Instrument peculiar for Dropsies; it is a Steel-Bodkin, sheathed in a *Cannula*, generally of Silver, and made use of to pierce some Cavities that contain Water.

THAT Instrument consists of two Parts; the first, *viz.* The *Bodkin*, is a small Steel Rod, quite round, hafted in its hinder part with a small Ivory Handle, not unlike the Head of a Cane, and big enough to hold it in the Hand. The foremost Part of that small Rod, must be four or five Lines in Length, and somewhat bigger than the remaining
Part

Part of the *Bodkin*, to contrive in it three Bevils, or three Sides, ending with three Angles; whence that Instrument has been called *Trois-Quarts*.

THE second Part of the *Trois-Quarts*, viz. the *Cannula*, is generally made of Silver: We consider in it its Body and its two Ends. The Body is a Tube of a cylindrical Figure, the Cavity whereof is proportioned to the Bigness of the *Bodkin*; the foremost End of that *Cannula*, is not only open, to let out the Water, the Pus, &c. but it is also pierced on the Sides, that the Matter may continually run out, though an Obstruction should be made in its foremost Opening. That Extremity must also be cut a little Bevil-like in its internal Part, to fit the Extremity of the *Bodkin*, which is bigger; so that by this means the *Cannula* is not bigger than the foremost End of the *Trois-Quarts*, and to make the *Cannula* still more level with the *Bodkin*, the Angles must reach beyond the *Cannula* at least by half a Line.

THE hinder part of the *Cannula* ends with a Plate quite round, somewhat concave on the side of the Handle, and consequently somewhat convex on the side of the Body of the *Cannula*. That Plate must have two small Holes in it to let in a Fillet upon Occasion.

As soon as the *Trois-quarts* is driven into the Belly, to bring out the Waters, they come out plentifully; and then they drop only upon the Patient's Skin, which is very unpleasant, and occasions an Itching, that is frequently the Cause of an *Erysipelas*. To prevent those Accidents, Mr. *Petit* has invented a peculiar *Cannula*. Instead of the Plate of the usual *Cannulas*, which I have just now described, he uses a kind of Spoon, much longer than it is broad,

broad, into which the Waters run; and they may be gathered by putting a Vessel underneath. That Spoon projects a little outwardly, that it may not hinder the Handle of the Bodkin from getting in and coming out. The same Spoon is attended with another Advantage, which is very considerable, since it serves instead of a Handle to the *Cannula*, when an Abscess is to be opened; for the *Cannula* has been opened all along its Body by the Direction of that Surgeon, and therefore it performs the Part of a grooved Probe.

LASTLY, a Surgeon must have some *Trois-quarts* of different Sizes, according to the different Parts, and the several Patients, that require the Use of that Instrument.

HAVING described at large the Instruments proper for the Operations of the *Abdomen*, I proceed to those that are used in the Operations of the Bladder, of the Parts depending upon it, and of the *Anus*.

THE Instruments which concern the Operations of the Bladder, and of the Parts depending upon it, are of three Sorts; some are used in the Outside of the *Penis*, others in the *Urethra* only, and others both in the *Urethra* and Bladder.

A SMALL Penknife is the only Instrument we make Use of for the Outside of the *Penis*.

THE antient Surgeons had an Instrument, the sharp Blade whereof being somewhat like our usual Penknives, moved them, perhaps, to give it that Name. To know that Instrument well, it ought to be divided into three Parts; the first is a small Steel Blade, sharp on the one Side, and rounded on the other, which is called its Back: It is about five or six Inches long, and two Lines broad, in its Beginning,

ning, from whence it lessens by Degrees to its Point. The second Part of that Instrument is its Tongue, shaped like the Handle of a Mill, being twice folded like a Hand-spit, which represents two right Angles. At the hinder End of the second Angle, there is a Tongue, which gets into the third Part of that Instrument, *viz.* the Handle: That Handle is generally of Ebony, as big as the little Finger, and about three or four Inches long.

THE Use of that Instrument consists in cutting the Skin of the *Præputium*, when there is a *Phimos*: Its sharp Point must then be covered with a small Wax Ball. But I have shewed elsewhere, that such a Precaution is very useless, when the Inflammation is considerable; and that a better Success may be expected from the *Bistouri* for *Hernias*, which Mr. *Lapeyronie* has enlarged.

THE Instruments made Use of only in the *Urethra*, are the Wax Candle Case, and the Wax Candles, of which I shall say nothing, since I have not mentioned them in the Operations.

THE Instruments made Use of both in the *Urethra* and Bladder, are those that are proper for probing, making Injections into the Bladder, and extracting the Stone out of it: The first are the Stone *Forceps*, and the grooved Probes, upon which I have sufficiently enlarged in the XVIth Chapter, where I discoursed of the Method of probing in the Diseases of the Bladder; and in the XVIIIth Chapter, wherein I describe the grooved Probe. *Syringes* are made Use of to convey Injections into the Bladder; but I shall be silent about them, because I have already described them.

THE second Instrument that gets into the Bladder is the *Bistouri* for the Stone, otherwise called *Lithotomus*.

To have a right Notion of this Instrument, I shall first consider its Blade, and then describe its Handle. All sharp Instruments ought to be made of Steel; and because the essential Property of the *Lithotomus* is to cut finely, it ought to be made of good Steel: The Blade of that Instrument consists of two Parts; one is the Blade, properly so called, and the other its Tongue; the Blade, properly so called, is all that Part of the *Lithotomus* contained out of the Handle. The Tongue of the *Lithotomus* has a Hole in it, to let in the same Nail that goes through the two Wings of the Handle or Scale; that Nail is riveted on both sides of the Scale, upon Rivets shaped like Roses, generally of Silver. At the hinder End of the Tongue there is a long Tail, ending with a transversal Tail.

THE Handle, or to speak more correctly, the Scale of that *Bistouri* consists of two Tortoise-shells very parallel, flat inwardly, and somewhat convex in their external Part. They are applied in one of their Ends, upon the Sides of the Tongue of the Blade, where they are stopped with a Nail, which goes through those three Pieces, as I have already said; but the other End opens like the Scale of a Lancet, and for the same Reasons. About the middle of the upper Part of that Handle, there is a small Notch, which serves to lodge the Lentil of the Tail of the Tongue, that the Blade may be unmoveable in its Scale, during its Operation.

THE Use of that Instrument consists, in cutting the *Perinaeum*, as I have said, discoursing of the *Lithotomy*.

THE third Instruments, that get into the Bladder, are the *Male* and *Female Conductors*.

THOSE Instruments are generally of Silver; they

they are like a Cross, eight or ten Inches long ; the upper Branch of that Cross must be very much inverted, to leave a greater Space between the two Conductors, for the freer Passage of the *Stone Forceps*. They contrive upon the Body of that Cross, a kind of Rib, that projects out, which begins insensibly upon the middle of the convex Part of the upper Branch, and encreases by degrees, till it reaches beyond the Arms of the Cross. Afterwards it goes in the same Size to the Foot of the Cross, where it ends at one of the Conductors with a Button jutting out and flatted on the Sides ; which is the Reason why that Instrument is called the *Male Conductor*. But in the other it does not go quite so far : On the contrary, it seems to disappear, by dividing into two, which occasions a hollow Cut, with which that Instrument ends, and from which it has been called the *Female Conductor*.

THE Use of those Instruments consists in conveying the *Stone Forceps* into the Bladder, as I have shewed in the Operation.

THE fourth Instrument that gets into the Bladder, to extract the Stone, are the *Stone Forceps*, the *Button*, and the *Hook*.

The *Stone Forceps*, is a kind of *Forceps*, the foremost Ends whereof are like very long Spoons, which serve to take the Stones out of the Bladder.

THE *Stone Forceps* consists of two Parts, like two very long *S's*, each Piece is divided into two Parts ; the first is the Ring, which is much larger than those of Scissars, because the *Forceps* are often held with both Hands ; Its Construction is not the same neither as that of the Rings of Scissars, which are somewhat long and *flatted*, as I have

said

said above ; but the Rings of the *Stone Forceps* must be round, and formed by the Circumvolution of the End of the Branch. What is next to the Ring, as far as the Junction, is called the Branch ; it must grow larger by degrees, to have more Strength, that it may not break when the Surgeon strives to take out the Stone. Its Figure is cylindrical, and perfectly smooth ; it is also a little crooked, to leave a space between the Branches, that the Parts may not be pinched. What is next to the Branch, represents the middle of an S, and is consequently crooked both Ways ; that Place is also broader than the Branch, and very much rounded in all its Angles ; it has internally a Depression, which joins in with the Depression of the other Piece. That Junction is fastened with a Nail well filed upon the two Pieces, so that it is level with them, and does not jut out at all.

THE fourth Part of the *Stone Forceps*, is what we call their Holds ; they are two Sorts of Spoons, very long, concave in the Inside, and convex in the Outside. The convex Part must be very smooth, and the concave must be so, only from the Nail to one half of the Holds, for some essential Reasons, which I have mentioned in the XVIIIth Chapter. But the remaining Part of those Holds must be provided with small transversal Grooves, thick set with several Rows of Teeth, like Graters, to resist extraneous Bodies. Those Holds ought to be somewhat crooked, to leave between them a Space, which serves not only to enlarge the Cavity of the Spoons, but also to prevent the Bladder's being pinched when they are shut. Lastly, The *Stone Forceps* in general, must be very smooth, especially the Angles of their Joints, to avoid pinch-

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ing the Flesh. Besides, they ought to be of good Steel, and of a Temper neither too hard nor too soft, for those two Extrems are dangerous; by the former they break upon a great Effort, and by the latter they yield and become pliant, which is as great an Inconveniency.

THE Stone *Forceps's* are not all equal; some are strait, others crooked, larger, of a middle Size, or small, according to the different Ages of the Patients, and the different Situations of the Stone.

THE *Button*, considered as a *Button*, is a kind of Probe, made use of to get into the Bladder, after the Extraction of a Stone.

To have a right Notion of that Instrument, one must know, that it is a Rod generally made of Silver, a Foot long at most, and larger at one End than at the other; But because that Instrument contains two others, I shall describe its Body and its Extremities.

THE Body of the *Button* is of a cylindrical Figure, which having a pretty large Basis, lessens by degrees, and then becomes crooked, and ends with a *Button*. All along the cylindrical Body, on the Side of the Crookedness of the *Button*, there is a Spine which, like those of the Conductors above-mentioned, performs also the Part of a Conductor, to introduce the Stone *Forceps* into the Bladder a second and a third Time, if it be necessary. The other End of the *Button* is much broader, it is hollow over-against the Spine, and like a very long Spoon.

THE Use of those Instruments consists in introducing the *Button* into the Bladder, to know whether there be a second Stone; in conveying the Stone *Forceps* along the Spine; and taking out the
Fragments

Fragments of a Stone, or the Clods of Blood with the Spoon.

THE *Hook* is the last Instrument made use of for the Extraction of the Stone. It is a kind of Spoon of Iron or Steel, half a Foot long together with the Handle; I shall therefore describe those two Parts. One may consider the Middle and the Ends of the *Hook*; the Middle is an Iron or Steel Stem, perfectly round and smooth, but bigger on the Side of the Handle: The foremost End of the Middle of that Instrument makes an Elbow, and then bends in the Shape of half a Crescent, and forms in that Bending a pretty long Cavity, which, at its End, must be armed with small Teeth, like a Grater: The other End is a round Piece of the same Matter, convex and smooth on the Side of the Instrument, but flat and coarsely filed on the Side of the Handle, upon which it is to lean. This is called by Artists the *Button* of the *Hook*. From the Middle of that *Button* proceeds a Tongue which is cemented in the Handle with Mastick: The Handle is generally of Ebony, and has the Figure of a Pearl.

THE Use of that Instrument consists in extracting the Stones that are in the Passage, either in the small *Apparatus* or otherwise.

To make an end of the Instruments peculiar to the Operations of the *Abdomen*, I proceed to the *Royal Bistouris*.

THOSE *Bistouris* are made much after the same manner as those which I have already described. They are narrower and longer; their Point is also different, for the common *Bistouris* are sharp-pointed or blunt; the latter end with a small Probe, three or four Lines long, and with a Button at its

end, or with a Point, in which there is an Eye to pass a Thread. Those *Bistouris* are three in number, a strait one, and two crooked; a strait *Bistouri*, and one of the crooked, have the small buttoned Probe at their end, and the other is bored through, as I have just now said.

THE royal *Bistouris* have been so called, because the crooked one, with a Button at its end, was used upon *Lewis XIV.* They are only proper when the *Fistula in Ano* is compleat, and not very deep.

HAVING described those Instruments that are used in the Operations of the *Abdomen*, I proceed to describe those that are peculiar to the Breast.

THEY are not so numerous as those of the *Abdomen*; they are common to many other Parts: For Instance, we have no other Instrument for the *Empyema*, but the *Bistouri*, which is common to several other Operations, and a *Cannula*, of which I have shewed the Disadvantages.

INSTRUMENTS proper for a *Cancer*, may also be used in all incised Tumours which happen in the several Parts of the Body. Those Instruments are a Stone *Forceps*, a Razor, and a double *Errhine*. Those Stone *Forceps*'s are called *Helvetian*, because Dr. *Helvetius* invented them; they are like Pincers, and consist likewise of two Branches, a Male and a Female one, that they may be united by an inside Joint. Each Branch may be divided into three Parts, *viz.* the Ring, the Branch, properly so called, or the Handle, and the half Circle or Crescent. I have shewed in the XXXth Chapter, that a Surgeon may be without that Instrument; and therefore I give but a superficial Description of it.

THE *Razor*, proper for the Operation of the *Cancer*, and incised Tumors, is made much after the same manner as common Razors; but it is much thicker, because the Tumors to be cut with that Razor make a greater Resistance than the Beard to a common Razor. Besides, the End of that Instrument ought to be blunt, and very much rounded, both in the Edge and Back, that the Operator may not run the hazard of cutting his Fingers. The Blade of that Instrument is kept open with the help of a small Iron Groove, which is set in two small Grooves, lying in the Inside of the Scale. Besides that the Instrument must also be made steady with some Turnings of a Fillet. I have preferred to that Instrument the common *Bistouri* moderately crooked; but if a Surgeon had a mind to use it, I would have a Tail to be contrived at the hinder Part of its Tongue, and I would put at its End a Lentil, that should get into a Notch in the Scale, as I have observed, speaking of the *Lithotomus*; and the whole might be fastened with some Turnings of a Fillet.

THE *Errhine* made use of in incised Tumors, is a kind of Steel Fork, the Ends whereof are crooked.

THAT Instrument is half a Foot long at most. It consists of a Stem, perfectly round and smooth, and ending at one of its Ends, with a Button leaning upon the Handle. From the Middle of the Button there arises a Tongue, which gets into a small Handle, and sticks to it with Mastick. The other End of the *Errhine* is divided into two Forks, four Inches long, very sharp at their End, and crooked, like Hooks.

THAT Instrument is mounted upon a Handle, generally of Ebony, as big as the little Finger,

and two Inches long; it is made with Facets, that it may have more Surfaces.

THE Use of the *Errhine* consists in catching the small distended Glands, which have not been taken off with the large Tumor, in order to remove them; for they would occasion a new Disease.

THE next Part to the Breast, according to the order I have followed hitherto, is the Neck, upon which I have only described the Operation of the Bronchotomy; and therefore we have no Instrument peculiar to that Part, but the small *Cannula*, which is introduced into the Opening made in the Wind-Pipe. That *Cannula* is very small and flat. In a word, its Dimensions are one Line, or one Line and a half in Diameter at most, three or four Lines in Breadth, and five or six in Length. There are on both sides of its upper Part, two small Loops to let in two small Fillets; it is a little crooked anteriorly toward its lower Part, to humour the Motions of the Wind-Pipe, and is rounded upon the Sides to avoid touching it.

THE Use of that *Cannula* consists in letting out the Air contained in the Wind-Pipe, and keeping the Air from getting into it.

THOUGH I have described no Operations in the Mouth, yet there happen frequently Diseases in that part, which require the Help of a skilful Hand. Among the Diseases incident to the Mouth and the adjacent Parts, there happen sometimes great Inflammations and Swellings in the *Amygdales*, and frequently large Abscesses, because those Glands are in Clusters like a Bunch of Grapes. It is usual to bleed plentifully in the first Disease, but when after much bleeding in the Arms, the Foot, and

and the Jugular, the Swelling continues, the Surgeon is obliged to make Scarifications upon those Glands. As for Abscesses, the best and quickest Remedy is to open them; but because it is no easie thing to operate in those Parts, in either of those two Cases, Mr. *Petit* has invented a very convenient Instrument, which he calls *Pharyngotomus*.

IT is a Lancet concealed in a *Cannula*, which comes out upon pushing a spiral Spring, and with which a Surgeon may easily scarify the *Amygdales*, and open the Abscesses contained in them.

I LOOK upon the *Pharyngotomus* as consisting of three Parts, a *Cannula*, a *Stilet*, and a *Spring*. Again I divide the *Cannula* into two Parts, the upper and the lower one; the upper Part of the *Cannula* is pretty like a small *Syringe* for Injections; I mean that it is made like a small Bore of a Gun, perfectly cylindrical, having in the Middle, and upon its Extremities, small Circles, not only for an Ornament and for Symmetry, but also to hold the Instrument more steadily. That Cylinder is hollow, very smooth in the Inside, and about three Fingers long. They solder upon the Middle of that small Bore, a Ring perfectly round and smooth, in which the Surgeon puts his middle Finger, the fore Finger upon the other Side of the Bore, and the Thumb upon the Button, which I am going to describe.

THE lower Part of the *Cannula* is the *Cannula* properly so called: It is of the same Matter as the Cylinder just now described; and a Silver one is the neatest and most proper. That *Cannula* is six or seven Inches in Length, three or four Lines in Breadth, and one Line, or one Line, and a half in

Diameter; so that it is long, not very broad, and very flat.

ALL the *Pharyngotomus's*, which I have seen, have that *Cannula* well soldered upon the lower Part of the small Bore just now described, which I look upon as a great Fault in that Instrument. I had rather it should be mounted with a Screw, for the Reasons which I shall mention hereafter.

THE second Part of the *Pharyngotomus*, is the *Stilet*: It is made of Silver, as well as the whole *Cannula*, and two or three Lines longer than the whole *Cannula*; the two third Parts of its Body ought to be flatted, in order to fit the Cavity of the *Cannula*; its two Ends are differently made, one of them is slit, to adapt to it a full-pointed Lancet, the Point whereof must not be very sharp; for it would soon be blunted; the other End is perfectly round, and like a small Cylinder for the Space of two Inches, at the End of which there is a small *Button*, in the shape of a Pearl dilated in its upper Part, and provided upon its Top with small threaded Grooves, to receive the Thumb upon an uneven Surface. An Inch under that small Pearl, there is a small circular Plate, placed horizontally, and soldered in that Place; or else they solder instead of it a small cross Bar, of the same Length as the Diameter of the Cavity of the Bore; which represents the Figure of a Cross. The Use of the Plate or cross Bar consists in leaning upon the Spring, driving it towards the lower Part of the Bore, and keeping the *Stilet* from rising more than it should.

LASTLY, the third Part of the *Pharyngotomus* is a spiral *Spring*, consisting of a Steel Wire, very elastic, and twisted like a Cork-screw. They put that Spring into the Bore above described; so that

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when the *Button* of the *Stilet* is squeezed, the small cross Bar, or the small circular Plate, brings the Threads of that Spring near one another; whereby the *Stilet* may move towards the Extremity of the *Cannula*, and the Lancet may quite come out to make Scarifications, or open an Abscess. As soon as the Surgeon gives over pressing the *Button* with his Thumb, the Spring removes it from the Part, and the Lancet gets into the *Cannula* again, and frequently all bloody, and covered with *Pus*. That Instrument must be taken to Pieces, in order to be cleaned; and if the Bore opens in its upper Part, the Surgeon must be feeling and trying, for the Space of an Hour, to pass a Fillet into the *Cannula*; (for it ought to be passed in its upper Opening;) but what is most inconvenient, is that the Lancet must be put again into the *Cannula*, and to that end it must be conveyed into the Cavity of the spiral Spring, which cannot be done without a great deal of Time, or without taking off the Point of the Lancet; I am therefore in the right, when I am for screwing the *Cannula* upon the Bore.

THE Instrument peculiar to the *Polypus*, is a *Forceps* with Rings, which I have already described, as well as those Instruments that are proper for the *Fistula Lacrymalis*. However, I shall observe, that Cauteries ought not to be cemented in the Handle with Mastick; for the Fire heating very much the Tongue of the Caution, it melts the Mastick, and the Instrument comes out of the Handle. On the contrary, the Caution must be screw'd upon the Handle, or its Tongue must be squarer and riveted at its End.

THE last Class of Instruments that make Divisions, takes in those which are used upon the hard Parts,

Parts. Those Sorts of Instruments are of several Kinds, as well as those made use of in the soft Parts, which I have just now described. I shall begin with the Instruments peculiar to the Fractures, a Disease which happens in the Bones, especially in those of the Scull ; and therefore I shall take a View of the several Pieces which constitute the Trepan.

IN order to examine the different Instruments, of which the Trepan consists, they must be reduced to three Kinds. Those of the first Kind are made use of to lay the Bone open ; those of the second pierce and saw it ; and the third cut the Unequalities left by the Coronet, raise the Pieces that are sunk, and serve in the Dressings.

THE Instruments of the first Kind, are of two Sorts : some are common to most Operations, and others peculiar to the Diseases of the Bones. The former are the *Probes*, the *Razor*, the *Bistouris*, and several others, which I have described in their proper Places. The latter are the *Rugines*.

BY the Word *Rugine*, I mean a kind of Raspatory, which serves to scrape and uncover the Bones.

THE *Rugine* must be considered in its Body and its Extremities ; the Body of the *Rugine* is a Silver Stem, four Inches long, perfectly round, and smooth towards its foremost End, but shaped Facetwise in the Middle of its Body, which grows larger as it comes nearer the Handle, where it ends with a small circular Plate applied to the Handle, and called the *Button*. From the middle of that *Button* proceeds a Tongue two Inches long, which is the hinder End of the *Rugine*, and cemented with Mastick in the Handle. The foremost End is a Steel-Blade well tempered, an Inch long, three or four Lines broad, sharp in its Circumference, and of a different Figure,

gure, according to the different Parts that are to be scraped; some having one of their Ends long, others having a crooked Point, and the last being perfectly square.

THE Handle is generally of Ebony or Ivory, four Inches long, and of a proper Bigness to hold it in the Hand conveniently.

THE Instruments of the second Kind, are all the Pieces, which make up the Trepan; they are pretty numerous, and very different.

I cannot better define the Trepan, than by saying, that it is an Iron or Steel Wimble, consisting of two Pieces, *viz.* the *Trepan*, properly so called, and the *Arbor* which supports it, designed to pierce and saw the Bones, but especially those of the Scull.

THE *Trepan*, properly so called, is of three Sorts; one is called *Exfoliative*, the second *Perforative*, and the third the *Crowned*.

THE *Exfoliative Trepan*, is a Piece of Steel, four Inches long, sharp in its lower Part as well as the Wimble of Coopers, to make a large Hole, and to remove the shaking *Laminæ* of the Bones.

IN order to examine that Instrument in all its Parts, I must consider its Middle and its Extremities. The Middle of the *Exfoliative Trepan*, is a Steel Stem, perfectly smooth, divided into two Handles, the one round in its Circumference, and the other like a Pearl, cut Facetwise, for the Beauty of that Instrument, and to handle it more steadily. The upper Part of that Instrument is a circular Plate, convex and smooth on the Side of the Stem, but flat and coarsely filed upon its upper Part, that it may more exactly be fitted to the unmoveable Pivot of the Arbor of the Trepan. That small Plate is called by Artists the *Button* of the *Exfoliating Trepan*.

pan. From the Middle of that Button there arises, in some Instruments, a Stem perfectly square, and an Inch high, upon one side of which there is a transversal Groove, engraved for such Uses as I shall mention hereafter. In other Instruments, that Stem is cylindrical, and turned like a Screw, whose Threads are somewhat large. I shall shew the Use of those Differences.

THE lower Part of the *Exfoliative Trepan*, is a Kind of square Blade, two Lines thick in its upper Part, somewhat less in the lower one, an Inch broad, and one Inch long. From the Middle of the lower End of that Blade, there comes out a small Wick, a Line and a half long at most, which from a broad Basis ends with a Point. That Blade, which is perfectly like the Wimple of Coopers, must have six Edges, which are all opposite; there are two upon the lateral Parts of the Blade, two in its lower Part, and two on both Sides of the small Wick just now described. Those Edges are perfect Bevils, turned from the Right to the Left, to cut from the Left to the Right. Lastly, that Blade must be of good Steel, and well tempered.

THE second Kind of Trepan, is the *Perforative*, so called, because it pierces. It is made of the same Matter as the foregoing, and differs from it only, because its lower Part, which is the Blade, ends with a sharp Point on the Sides, not unlike the Figure of a Pike. The most common Use of that Instrument, is to make a Hole upon the Skull, in order to put into it the Pyramid of the *Crowned Trepan*, and therefore its Point ought to be proportioned to that of the Pyramid. But the Surgeon may frequently use it to make several Holes upon other Bones, for Instance, upon some *Exostoses*,
that

that he may afterwards take them out with the Chiffel and Mallet.

LASTLY, The third Trepan, which I have called the *Crowned*, is like the two foregoing in its Middle and its Extremities. It must also be of the same Matter, I mean, of good Steel; but this ought not to be tempered, for some obvious Reasons, made good by constant Experience.

THE lower Part of that Instrument is like the Figure of a Crown, which is the Reason why, it has been called the *Crowned Trepan*. If we consider it inverted, we may compare it to a Bushel of one Inch and a half in Height, and one Inch in Diameter. The Bottom of the Cavity of that Vessel, must have a greater Diameter, and consequently a greater Circumference than the Entrance, that the Piece of Bone which the Surgeon saws, may enter and ascend into the Bushel without Resistance, as the Crown sinks. The Cavity of that Bushel must also be perfectly round, and pretty smooth, that the Piece of Bone may not catch in it: but its external Part, as well as the internal one, is broader towards the Bottom of the Bushel, and insensibly descends and diminishes. That Mechanism is of no small Importance, since by that means the Coronet saws the Bone bevil-like, and the Bone is cut in such a manner, as to be able to support the Coronet, and keep it from falling all of a sudden upon the *Dura Mater*. Lastly, The Outside of the Coronet is jagged, with two and twenty, three, or four and twenty Bevils, turned from the Right to the Left; they lie, as it were, upon one another, and form some Edges likewise from the Right to the Left. Those Bevils do not fall in a perpendicular Line, from the upper Part of the Crown to the lower; but they

they descend obliquely, to cut the better. Lastly, each Bevil ends with a small Tooth, which forms, together with the rest of the Bevils, a circular Saw.

THE Teeth and the Bevils of the *Crowned Trepan* grow blunt, and wear out as well as sharp Instruments, and therefore they must be mended now and then, or new ones must be made. Sharp Instruments cannot be mended or set, but with a Grind-Stone, by reason of their Temper.

IT appears from the Description I have given of the *Crowned Trepan*, that its Teeth and Bevils cannot be set upon a Grind-Stone; a File is therefore necessary to mend them. Now, I desire all Surgeons, who will have the Coronet to be tempered, to tell me whether a File can affect a well-tempered Steel; and because the Thing is impossible, I conclude, that the Coronets of Trepan ought not to be tempered. Besides, it has been observed, that when the Coronets were tempered, their Teeth broke every now and then; which moved great Surgeons to advise their Scholars to get two Coronets of the same Size, that when one of them happens to break, the other might supply its room.

TO make an end of the Description of the *Crowned Trepan*, it remains only to discourse of its Pyramid, and the Key, which screws and unscrews it. The *Pyramid* of the *Crowned Trepan*, is a Kind of Perforative, or rather, a Bodkin, of the Length of the Crown. That Pyramid ought to be considered in its Middle, and in its Extremities. The Body is perfectly square, that it may be turned with the Key. The upper End (I consider all those Instruments in their proper Situation during the Operation) is a Screw, turning contrarywise, that it may not relax in the Operation of the Trepan. The lower

End

End ought to be made in the Shape of a Serpent's Tongue, sharp on the Sides, and pointed like the Perforative.

THE *Key* is an Iron Instrument, consisting of a Ring very irregular, having frequently the Figure of an Octagone, sometimes of a Cube, and often like Trefoil. In one of the Extremities of that Ring, there is an Iron Stem two Inches long, and as big as a large Quill; that Stem is pierced square along its Body, to receive the Body of the Pyramid, which I have said to be of a square Figure.

THE Arbor of the Trepan is like the Wimble of Joiners, I mean, that it is, as well as that Instrument, made up of a Handle and a Branch bent Elbow-like. I consider two Parts in that Branch; the first is the Branch of the Trepan, and the second contains two Pivots, upon which the Branch appears, as it were, soldered, though those two Pieces make up but one. That Branch may be further divided into three Parts, the two first whereof are placed horizontally, and, as it were, soldered upon the Pivots; and the third is perpendicular, and, as it were, soldered upon the Extremities of the two horizontal Branches. There is in the Middle of that perpendicular Branch, a Steel Head, as big as a small Nut, and having in its Circumference small perpendicular Furrows to present unequal Surfaces to the Fingers of the Hand that is to hold it. One of the Perfections of that Head, consists also in turning about its *Axis*, which very much facilitates the Operation of the Trepan, and is not so troublesome to the Surgeon.

THE Pivots of the Arbor of the Trepan, are two in Number, *viz.* the upper and the lower one; or to express the Thing according to the Language of
of

of Artists, one is moveable, and the other unmoveable; the moveable, or the upper one, is five Inches long. We consider in it three Parts; the upper one is a round Tongue, as big as a Quill, and two Inches long; that Tongue is thrust into a small Handle of Ebony or Ivory, well turned, of the same Length, and as big as ones Finger; and it is riveted in its upper Part, upon a small, round Piece of Iron. In the upper Part of the small Handle, there is a Screw, which is fastened to a Handle of the same Matter, and of a flat Figure, circular and symmetrically rounded in its Circumference. The middle Part of the moveable Pivot, is a Stem likewise of Steel, consisting of a small, round Head, in the Shape of a Pearl, in the upper Part of which there is a round Piece, which leans upon the Handle, and is called the Nut of the Pivot. Lastly, The lower Part of that Pivot is one Inch long, it is cut with eight Sides, to one of which adheres one of the horizontal Branches: It ends with a Button, very smooth, and like the Figure of an Acorn; that Pivot is called moveable, because its Tongue turns in the small Handle of Ebony, which I have just now described.

THE unmoveable, or lower Pivot, appears outwardly to be like the lower Part of the moveable Pivot; but the former is hollow in the Inside, to lodge the Stems of the Trepanns above described; and because that Stem is of different Figures in different Trepanns, it follows, that the Cavity of the unmoveable Pivot must be square or round, to fit the Stems of the Trepanns. When the Cavity of the unmoveable Pivot is square, that Pivot must have one of its Sides open almost in its whole Length, to put it into a Spring of the same Length; that

Spring

Spring consists of two Pieces; the first is a Steel Blade, pretty strong, in the upper and external Part of which there is a small Button, round and very smooth. In the middle of its internal Part there is an Eminence cut out sloping, and pierced by a Hole that goes through it; this is called the Tenon of the Spring; and a little farther, towards its lower Part, there is a round Eminence likewise cut out, sloping and very smooth, called the Nut of the Spring. The second Piece of the Spring, is a small Steel-Blade, very elastick, fastened near the Tenon, and which projects towards the upper Part of the Spring, and goes from it. That Spring is mounted in the immoveable Part of the Arbor of the Trepan, with the help of a flat Nail, which goes through the Pivot and the Tenon, so that when the square Stem of one of the Trepan is introduced into the square Cavity of the Point of the Arbor, the Nut of the Spring gets into the transversal Groove, engraved upon one of the Sides of the Stem, which keeps the Trepan pretty fast in the Cavity of the Pivot of the Arbor. But when the Surgeon designs to take off the *Crowned Trepan*, or another, he lays his Thumb upon the Button of the Spring, by which means it turns up, and the Surgeon takes off the Coronet.

WHEN the Cavity of the unmoveable Pivot of the Arbor, is round, it is fashioned internally with spiral Grooves, which serve to receive the Threads of the Screw, to be found about the cylindrical Stems of the Trepan. Those Grooves are made contrarywise, to prevent the Trepan's being dismounted in the Operation.

IN order to make an end of our Reflections upon the different Pieces of the Trepan in general, I shall say something about the Instruments of the third Kind, which serve to cut the Unequalities left by the Coronet, to raise the Pieces of Bones that are sunk.

THE Instrument proper to cut the Unequalities left by the Coronet, is the *Lenticular Knife*; That Instrument is made like the *Rugines*, only with this Difference, that it ends with a Knife two Inches long; all Artists make one Side of that Knife flat, which I very much approve; but I do not approve so well the convex Figure which they give to the other Side of that Instrument, because its Edge cannot then reach the Unequalities to be found at the Circumference of the Hole of the Skull, unless the Surgeon take a particular Care. There is in the lower end of the *Lenticular Knife*, a small Button, very flat and smooth, to go over the *Dura Mater*, without hurting it.

THE Instruments proper to raise the Pieces of of Bones that are sunk, go by the Name of *Elevatories*; that Instrument is a Kind of Leaver, above half a Foot long, adorned with small Heads in the Middle, but ending with two Branches, one of which is crooked on one Side, and the other on the other Side. Those Branches are made Facet-wise, to hold that Leaver more steadily; and they grow flat and broader, as they come nearer the Extremity, where they end with small transversal Grooves, which are made like small Bevils, lying one upon another, and which seem to proceed from the Extremity of the Branch towards the Middle. The Branches of the *Elevatories*

vatories are differently crooked, some being almost strait, some a little more crooked, and some very much turned Elbow-wise, to serve sometimes as a propping Point. Lastly, The Extremities of the Elevatories end also differently, some being rounded at the End, some of an Olive-like Figure, and others square.

THE particular Instrument made use of in the Dressing of the Trepan, is called *Meningophylax*; its Structure is like that of the *Lenticular Knife*, only with this Difference, that the former has no Edge; but in its room there is a small Cylinder, perfectly round.

THE Use of that Instrument consists, in leaning upon the *Dura Mater*, whilst the Patient makes a great Expiration, to let out the Blood or *Pus* that is diffused; that Instrument is commonly made use of to dress the Opening of the Scull; but I prefer the small Leaves of Mr. *Petit*, which I have described in the XLth Chapter.

TO make an end of the Description of those Instruments that are proper for the Operations of Surgery, it remains only that I should discourse of those that are made use of to cut off the Limbs.

THREE Sorts of Instruments must be used for the Amputation of Limbs; the first serve to cut the Flesh about the Bones, the second to saw the Bones, and the third to stop the Blood.

THE Flesh about the Bones, is cut with *crooked* and *strait Knives*; the crooked Knife, or the Knife of Amputation, is almost one Foot in Length; its Figure is half a Crescent; it is three Inches broad near the Handle, and lessens by degrees, till it forms a Point: Its Back is pretty thick, and perfectly

smooth in its whole Length, wherein that Knife differs from that of the Antients, which had a Ridge in its Back to scrape the *Periosteum*. There is also in that Knife, a Plate cut with eight Facets, somewhat convex on the Side of the Blade, and perfectly smooth, but flatter on the other Side, and coarsely filed, that it may the more exactly be fitted to the Handle. That Plate is called the Button of the crooked Knife ; near that Plate the Blade of the Knife juts out about one Inch ; that Projection is pretty round, and very blunt ; it serves for a Prop to the Thumb in the Time of the Operation: This is called the Shoulder of the Knife by Artists.

THE Handle of the crooked Knife is commonly of Ebony, six Inches long, and of a Bigness requisite to fill the Hand ; its Figure ought to be with eight Facets, not only for an Ornament, but also to hold it fast : It must end in its hinder Part with a Kind of Convolution, or rather an Eagle's Head, the Bill whereof shall be turned on the Side of the Back of the Knife, to serve as a stay to the Fingers of the Operator.

THE *strait Knife* is made Use of to cut the Flesh between the Bones of the Leg, or fore Arm ; but because I have sufficiently described that Instrument, I need not say any Thing of it here.

THE *Amputation Saw* may be divided into three Parts: The most material, is the Blade or Saw, properly so called ; the second is the Arbor of the Saw, and the third is the Handle.

THE Blade of a Saw is elastick, a Foot long, and two Inches broad, and made of a Piece of Steel forged cold, and consequently
without

without being tempered, for the Reasons above-mentioned, when I spoke of the Coronets of the Trepan. The upper Part of that Saw is the Back, which ought to be very thin, and the lower is the Edge set with many small Teeth, which alternately project outwardly, to make more Way for the Back of the Blade. But when the lower Part of the Blade is three Times thicker than the Bone, there is no need the small Teeth should project outwards.

THE Arbor consists of three Branches. One is placed horizontally, and in the parallel Line of the Blade ; and the two others are perpendicular, and serve to hold the two Ends of the Blade, *viz.* the foremost, with the Help of a flat Screw, and the hinder one with a Screw that serves to brace the Blade. The Handle of the Saw is like that of the crooked Knife.


THE Instruments proper to stop the Blood, are the *Needles*, the *Duck-bill'd Forceps*, the *Vallet à Patin*, &c. I have sufficiently described them above.

THUS I have at last made an end of this Work. I shall be very well rewarded, if young Scholars receive it with the same Pleasure as I offer it to them, and if they reap any Benefit from it.

FINIS.



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